

5.7.2 WILDLIFE TOURISM

5.7.2.1 Dibru Saikhowa National Park

It is a National Park located in Dibrugarh and Tinsukia Districts which is bounded by the Brahmaputra and Lohith Rivers in the north and Dibru River in the south. It is approx. 92 km far from Dibrugarh town spreaded in 200 sq.km area. It is the largest salix swamp forest in the north-eastern India. It is one of the 19 Bio-diversity hotspots in the World. It is also an ideal place for various adventure sports and the rugged landscape of the forest is ideal for trekking and mountain hiking trips. Originally created to help conserve the habitat of the rare white-winged wood duck, the park is also home to other rare creatures such as water buffalo, black-breasted parrotbill, tiger and capped langur.



Dibru Saikhowa National Park

5.7.2.2 Dihing Patkai Wildlife Sanctuary

The forest is often called as "The Amazon of the East" owing to its large area and thick forests. Dihing Patkai National Park is located partly in Dibrugarh and partly in Tinsukia district of Assam. It covers an area of 231.65 km² (89.44 sq mi) rainforest. It is 105 km far via NH 315, 99.8 km via NH 215 & Duliajan-Digboi Road. It has 3 parts Dirak rainforest, upper Dihing river and Jeypore. World War II cemeteries, Digboi Oil Refinery and the still well Road are also located in the close proximity. Dihing Patkai festival takes place in February and this is the best time to visit and September to march are the best months.

Being a completely virgin rainforest, this sanctuary is very rich in biodiversity. It is an ideal habitat for non-human primates. Till date, 47 mammal species, 47 reptile species and 310 butterfly species have been recorded. The most common mammal species of this sanctuary are hoolock gibbon, slow loris, Assamese macaque, stump-tailed macaque, capped langur, Asian elephant, Bengal tiger, Indian leopard, gaur, Chinese pangolin, Himalayan black bear, Red giant flying squirrel, leopard cat, clouded leopard, porcupine, crab eating mongoose, sambar, sun bear, binturong, barking deer, Asian golden cat and marbled cat. Dihing Patkai rainforest harbours about



Mammal at Sanctuary

293 bird species, belonging to 174 genera and 51 families. The majority is resident (63.7%), some are winter visitors (23.1%), and very few are summer visitors (2.5%). About 10.7% are altitudinal migrants, coming mainly from the higher reaches of the western, central and eastern Himalayas. Avifauna includes slender-billed vulture, white-winged duck, greater adjutant, lesser adjutant, greater spotted eagle, yellow-vented warbler, broad-billed warbler, white-naped yuhina, white-cheeked partridge, great hornbill, brown hornbill, Oriental darter, osprey, kalij pheasant, grey peacock pheasant, besra, black baza and hill myna.



Blue Eared Kingfisher

¹ Chakraborty, Avik (7 December 2020). "Environmentalists hail Assam government's decision to upgrade Dihing Patkai Wildlife Sanctuary into national park" *newswin in Northeast*. Retrieved 14 December 2020

² Choudhury, A. U. (2013). *The mammals of North East India*. Guwahati: Gibbon Books and the Rhino Foundation for Nature in NE India

³ Bhattacharjee, J. (2013). "Exploring Environmental Movements in Assam: Some Case Studies"



5.7.3 OTHER IMPORTANT TOURIST DESTINATIONS AROUND DMPA*Table 79 Important Tourists places, their distance and importance in and around Dibrugarh MPA*

From	To	Distance	Importance
Dibrugarh	Naharkatiya Tea Estate	51.1 km via NH 215	It is one of the Historic Landmark which was named after the neighboring town of Naharkatia which in Assamese denotes an area cleared by cutting Nahor trees.
	Chabua Tea Estate	34.1 km via NH 15	It is one of the Historic Landmark. The tea estate occupies a unique place in the history of tea plantation.
	Zaloni Golf Club	47.4 km via Duliajan-Dibrugarh Rd	It had got the recognition and rating from Indian Golf Union, Calcutta. A specialty of this course is that it is flood-lit.
	Eastern Bastion Golf Course	28.2 km via NH 15	Eastern bastion golf course is very much renowned for its various features like outstanding location, extraordinary fairway, greens and rough ways added up with the wildlife around the course.
	Naharkatiya Planters Club Golf Course	61.1 km via NH 215, 79.4 km via Moran - Naharkatiya Rd	It is a place where full of greenery all around with tea gardens.
	Oakland	32.3 km via NH 15	It is a picnic spot alongside the river Brahmaputra in the vicinity of Oakland Tea Estate
	Dilih Ghat	73.5 km via NH 215	A very nice winter picnic spot in the river Dilih. There is a bridge linking Sivasagar and Dibrugarh District at this place.
	Jeypore Reserve Forest	60 km via NH 215	It is one among the few remaining tropical forest patches of eastern Assam which is a part of the Eastern Himalaya biodiversity hotspot region. Famous for the largest known population of the Endangered White-winged Duck, five species of Hornbills
	Sasoni - Merbil	72 km via NH215	The Merbil is a wet land area and it has a habitat of different species of birds and reptiles including the Siberian Crane and python respectively and is also endowed with rich aquatic flora and fauna.
	Tai Phake Eco-tourism Camp	58.5 km via NH215	With a unique blend of smell of rainforest and touch of a minor but well cultured beautiful community of Phakials, the "Tai Phake Eco-tourism Camp (TPETC)" is an ultimate destination for wildlife lovers.

5.8 HERITAGE

Conservation of buildings, artefacts, structures, areas and precincts of Historic, aesthetic, architectural, cultural significance (Heritage buildings and heritage precincts) will fall under the norms prescribed by the ASI, would need redevelopment and redesign without hampering the fabric of area. Following are the tangible and intangible identified heritage site which fall under the National, Regional and Local context levels.

5.8.1 HERITAGE AT REGIONAL LEVEL

Dibrugarh is a historical place in Assam having evidence of the rule of the Ahom dynasty. Dibrugarh town has many Maidams (graveyard) which bear the royal structure and are epitome of the glorious rule of the Ahom Empire in Assam. The Ahom Kingdom was spread across most places in Upper Assam including Dibrugarh. Many maidams were built during the time of the Ahom kindon in Assam in honour of the Ahom rulers. These maidams in Dibrugarh also serve as important tourist places here. Some of these maidams and historical sites in Dibrugarh are:

5.8.1.1 *Barbaruah Maidam*

The Barbarua Maidam is one of the famous tourist places located at Sessa Tiniali, NH-37 about 14 kms away from the Dibrugarh. There are two main graveyards here that were constructed in order to honour the two well-known officials of the Ahom Dynasty. The architecture patterns used in the Maidams depict the fine work of engineering of the ancient times. As the graveyards were built to honour high rank holding Ahom officials, the size and structure of them are quite big. There is a believe that the site probably consists of Maidam of Alan Barbauah Dihingia, who constructed several temples during Ahom Kingdom. The Maidams reflect aristocracy and royalty in their design and structure. The place has many other small maidams which were built to honor the other small officials of the Ahom period. The Barbarua Maidam is a clear image of how respectable the dead soldiers are for the people of Dibrugarh.



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5.8.1.2 *Bahikhowa Maidam*

Situated in the Khowang tea estate area of Dibrugarh, the Bahikhowa Maidam is dedicated to Bahikhowa Rajeswar Singha, the Army staff chief of the Ahoms during the reign of Swargadeo Rajeswar Singha. The tomb stands in the memory of the army chief. The vast tea estate encircles the Bahikhowa Maidam and add more charms to its appearance. Bahikhowas Maidam also consists of smaller Maidams which are in ruins at present.

5.8.1.3 *Lekia Chetia Maidam*

Located in Sessa near Mankota road, Lekia Chetia maidam was constructed in honor of Lekia Chetia, an officer of the Ahom kingdom during the reign of Swargadeo Pratap Singha. The maidam is large in size compared to the other maidams and presently also serves as a 'Thaan' (Assamese religious place).

5.8.1.4 *Sarumechlow and Bormechlow Maidam*

Sarumechlow and Bormechlow Maidams are located in the Lengeri Mouza locality of Dibrugarh. These two maidams are the graveyards of the queens (Sarumechlow and Bormechlow) of King Sukhamppha Khura of Ahom dynasty.

5.8.1.5 Moira Mora Satra

It is a brick built pancharatha Temple plinth of Pre-Ahom period stylistically datable to the 9th-10th Century A.D., consisting of various stone sculptures. The excavation revealed a brick plinth of a temple of Hindu pantheon having garbhagriha and mandapa. Trace of an antarala has been found in between the two segments. The eastern parts of both the segments of the temple got eroded by the activities of now morbid river. The adhistanas part of the garbhagriha has two horizontal brick moulding that looks like imitation of the



basement of a stone temple design. The plan of the garbhagriha has seven projections in each corner for which it may be called a saptaratha temple. The garbhagriha wall is 2.35 metres wide, while the inner part of the garbhagriha is 2.60 metres by 2.80 metres. The length of the existing mandapa wall is 4.75 metres,



while the entrance and stairs of the mandapa is completely missing. The outer part of the adhistanas was plastered by lime.⁵

Though the temple is small in size, it is a solitary example in upper Assam having immense importance and significance. It was believed that this part of the State was a barren land before the advent of the Ahoms, but discovery of this saptaratha temple plinth helped in redrafting the history of this area back to 9th century AD.

5.8.2 HERITAGE WITHIN TOWN

5.8.2.1 District Court Dibrugarh

The British arrived in Assam in the year 1826 as per Yandaboo Accord and since then they selected Dibrugarh as a centre of Administration as well as business purpose in Upper Assam. In the year 1842 Dibrugarh was announced as the Head Quarter of Lakhimpur District. The court was also shifted to Dibrugarh in the same year from Lakhimpur. Administrative functions were executed from ward No. 1 of the Central Jail of Dibrugarh till construction of a permanent court building. It is to be mentioned that ward No.1 was the first "Pacca" building in the entire North- East region. In the early stage the Sadaramin and the Munsiff court were established for Judicial Administration. Probably the present court building was constructed in the year 1870. The required materials like rod, cement etc. were carried by steamer through the water route of River Brahmaputra for construction of court building. A bricklin was constructed at Chaulkhowa for making bricks. After passing about one and half century the court building is still standing proudly at Phulbagan near Brahmaputra River. Since more than 150 years the Judicial functions are running from this court building till today, it may be mentioned that the life of the building was expected for one hundred years only. In this regard, a letter was received by the Deputy Commissioner, Dibrugarh in the year 1999 from LONDON. It is sure that the building will last for more than one hundred years though it has already crossed long one hundred years.

⁵ <https://assamtribune.com/palaeo-channel-of-dihing-found-near-archaeological-site>, Accessed on 14th Nov,2021

5.8.2.2 Dibrugarh Town Railway Station

With discovery of Tea in early 1823 by the British, followed by oil and coal in area near Dibrugarh Town, the significance of the town as a centre of commercial and industrial activities was enhanced. Assam got its first railway line in the year 1881 when commercial trade was at its high in Dibrugarh. The 65 km long metre gauge line was constructed from Dibrugarh to Margherita. This metre-gauge railway was owned by Assam Railways and Trading Company (AR&TC), which was incorporated by John Berry White for transportation of Coal, Tea and public in the rapid growth of the tea industry. The first section of the line opened in 1882 from Brahmaputra River steamer ghat, Dibrugarh eastward, 15 miles. A 40 miles track between Dibrugarh and Makum was opened to traffic on 16 July 1883. The first railway junction in Assam was Makum Junction on the railway line that opened in 1884 to Dihing bridge. The railway network was converted to 1,676 mm (5 ft 6 in) broad gauge in late 1990s.



5.8.2.3 Berry White Medical School

The building of the Berry White Medical School constructed around 1898. Berry White had served as Civil Surgeon of Upper Assam in the 1870s after retiring from the British Army, and it was he who drew up plans for setting up a medical school in Dibrugarh. While he had donated his entire savings, about Rs 50,000, for the establishment of the medical school, White passed away in 1896, four years before his dream project actually began to function. The medical school was later converted to Assam Medical College in 1947, to become the first medical college in the entire Northeastern region.

A 120-year old building where the Berry White Medical School – later Assam Medical College – had started way back in 1900, is being conserved with Indian National Trust for Art and Cultural Heritage (INTACH) being entrusted the task of renovating it.




5.8.2.4 Central Jail

Central Jail is located in the core city area of Dibrugarh town at Phulbagan. This jail was established in the year 1859 as District Jail and subsequently upgraded to Central Jail, presently known as Central Jail Dibrugarh. Central Jail Dibrugarh has the capacity to host 680 nos. of Prisoners.



5.9 ISSUES AND POTENTIAL

The Dibrugarh district and city has immense potential and scope for the tourism industry. Dibrugarh is best known for her unique natural beauty with flora and fauna, historical monuments, tea gardens, golf courts in the tea gardens and its colourful cultural festivals. The various places of visit can be nature related, religious, historical etc. The whole tourism potentialities can be grouped together under the following categories:

1. Ethnic Tourism
2. Leisure Tourism
3. Tea & Golf Tourism  **Main Focus**
4. Wildlife Tourism
5. Medical Tourism
6. Eco Tourism
7. Spiritual Tourism

5.9.1 HERITAGE ISSUES

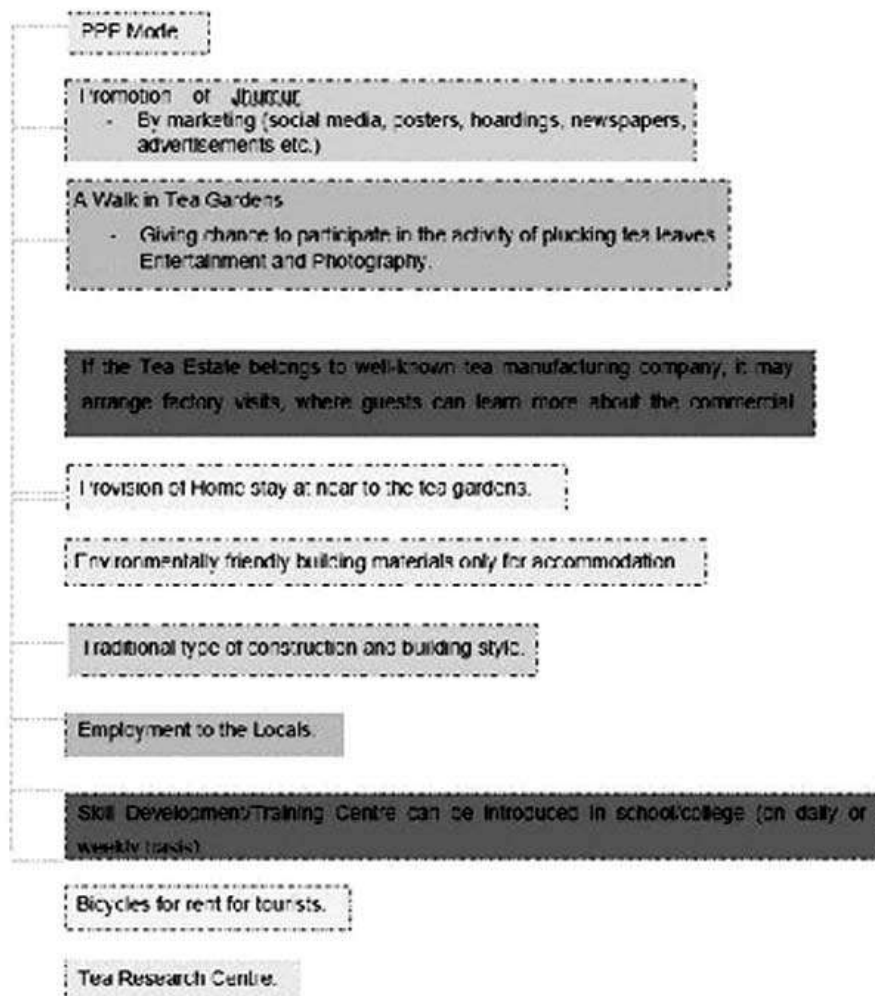
1. **Dilapidated Condition of structures:** Most of the heritage structures are in dilapidated condition due to the unavailability of conservation, restoration and preservation practices in Dibrugarh area. These structures need periodic preservatory treatments in order to enhance their cultural life for coming generations.
2. **Unavailability of Infrastructure and Services:** There is an absolute absence of proper infrastructure and services in the immediate areas around the possible heritage as well as tourist spots of Dibrugarh. The basic tourist amenities also lack at these places which have to be planned accordingly.
3. **Absence of Monitoring:** There is no nodal body responsible for periodic monitoring of the heritage structure around Dibrugarh. Such nodal bodies are to be constituted in order to provide proper jurisdiction to such capable heritage areas so that there's no threat to them in future.
4. **Haphazard Development:** The unplanned developmental activities around the heritage sites are serious threats and it harms the integrity of the heritage structures. Such activities are to be monitored by a proper administrative framework under by the local, regional or state authorities.
5. **Lack of Awareness among Public:** The citizens are unaware about the cultural assets owned by them and they are to be made aware in order to have proper public participation in order to preserve such important historic sites. Public participation is an utmost important aspect for the conservation of any site.
6. **Absence of Legal Plan:** There is an absence of a visionary master plan available specifically for the heritage sites in Dibrugarh. Such important sites require a separate space in the administrative framework of the authorities in the form of a legal document which has been prepared after consulting proper stakeholders and experts.
7. **Documentation of Heritage Structure:** The heritage structures of Dibrugarh region are not documented till date. There is a need of proper listing and documentation of heritage sites in Dibrugarh. Such sites are to be properly listed under various grades of their importance and documented specifically so that a proper conservation approach can be implemented for such important sites.

5.9.2 TOURISM ISSUES

1. **Poor Road Connection:** The roads are in poor shape in many of the tourist spots. Some of the roads cannot be used during the rainy season. The pucca roads too are crying for attention.
2. **Absence of Tourist Facilities:** A tourist expects some basic facilities like well-maintained toilets and eateries.
3. **Poor Maintenance:** The tourist spots are neglected to say the least. Most of the infrastructure are in bad shape and needs urgent renovation. Caretakers are non-existent which affects the maintenance.
4. **Haphazard Development:** Unplanned and un-organized development activities can be seen round various tourist places and at some of the places, the slum development can be seen.
5. **Lack of Promotional Activities:** There is lack of promotional activities in Dibrugarh to conserve and protect the heritage structure and values. Residents of the city are not even aware of the importance of culture and heritage of the Dibrugarh Town.
6. **Lack of Awareness among Public:** The peoples visiting the monument or staying in the surrounding area are not concern to save the heritage of the city. Lettering within the premises of the building is the common practice of the people.
7. **Lack of information:** There is lack of information for the tourists regarding the tourist spots, their significance, and location. Guide facilities are also not there.

5.10 PROPOSED STRATEGIES TO BOOST TOURISM

5.10.1 STRATEGIES FOR TEA & GOLF TOURISM



5.10.2 CAPACITY BUILDING

- Selected villages should be given assistance for showcasing of handlooms and handicrafts to help the villagers sell their products. The Handloom Trade Centre can be proposed at Chowkidingee place as the place having consumer friendly.
- If necessary, city can have tea exhibition centers for a group of tea growing villages also. That will also serve as tea museum and will attract tourist and hence will boost the tea economy.
- Local Art and Craft centers can be proposed. This will help to sustain the crafts as these activities will help generate income for the villagers.
- Local youths can be trained to become tourist guides. They already have adequate knowledge about the places; they just need to be trained to enhance their soft skills so that they are in a better position to interact with the tourists.
- To develop a proper website, that enables to give enough information to domestic and foreign tourists.

5.10.3 STRATEGIES FOR CULTURAL COMPLEX CUM PARK DEVELOPMENT

- One cultural hub come park could be developed where the art of the different community people can be placed, and the place should be designed in such a way that it should be environmentally friendly.
- One side of the hub can be used to exhibit their traditional ornaments, dresses and food so that tourist can also enjoy their culture and tradition.
- The other side can be used for recreational which includes landscape and sculptures.
- The facilities like parking, drinking water and toilets should be provided inside the park.



Land scaping



Art works



Sculptures

- Promotion of Traditional Fairs and Festivals through government and NGOs participation so as to generate awareness among the new generation towards rich cultural heritage and inviting cultural tourism
- Development of a Cultural Complex at Dibrugarh with infrastructural development for round the year activities
- Centre for Development of handicrafts development and tourism promotion for the region.

5.10.4 STRATEGIES TO BOOST TRIBE CULTURE

- Tai Ahom's, Mishing, Sonowal Kachari, Deori, Moran, Bodo and other tribes are living in Dibrugarh region.
- They had different culture and tradition on their own way.
- They celebrate the Bihu festivals on their own culture and tradition.
- Some of the festivals like Dehing Patkai festival, Chavang kut festival, Tea festival are celebrated in Dibrugarh by different community people.
- Dances like Jumur Nach, Sonowal Kachari nritya are performed by the people at the time of their festivals.

The existing open spaces should be used for multipurpose such as that should be provided to the different communities during their festival times to show case their culture and tradition.

Temporary commercial stalls should be developed, and no permanent construction should be constructed, and basic infrastructure facilities should be provided to avoid problems.

5.10.5 STRATEGIES FOR DEVELOPMENT OF RECREATIONAL AREA

Recreation is any physical or psychological revitalization through the voluntary pursuit of leisure time. It is an activity which is relaxing to people and provides diversions from their normal routine. Generally, there are four types of recreation activities:

- **Revitalization:** restoration and enhancement of mental and physical health.
- **Play:** relaxation and exercise
- **Adventure:** excitement and challenge
- **Education:** organized and incidental

City level recreational facilities are of two types:

- **Indoor facilities** consist of libraries, clubs, cinema hall, auditorium, multiplex, art and craft centre, shopping malls, food courts, cyber cafés, gymnasium etc.
- **Outdoor recreation facilities** consist of gardens, parks, play grounds, golf courses, zoo, botanical garden, race course, stadium, exhibition ground, water sports complex, green ways, bike ways etc.

5.9.5.1 Proposals for Augmentation and Development of Recreational Facilities

- Development of green belts, plantations, parks, Ghats, plazas along the Brahmaputra riverfront abreast the Urban set up and invite nature in harsh built environment through myriad ways.
- Amusement Parks to be developed along with horticulture, Pisciculture, herbal parks, etc.
- Development of eco-tourism with provision of water theme parks, lagoon resorts, weekend resorts and world class recreation centres such as club towns, golf clubs, spa resorts, etc. at Planning Area level.

5.10.6 POLICIES FOR TOURISM DEVELOPMENT

As a service industry, tourism has numerous tangible and intangible elements. Major tangible elements include transportation, accommodation, and other components of a hospitality industry. Major intangible elements relate to the purpose or motivation for becoming a tourist, such as rest, relaxation, the opportunity to meet new people and experience other cultures, or simply to do something different or have an adventure.

Tourism is vital for every place, due to the income generated by the consumption of goods and services by tourists, the taxes levied on businesses in the tourism industry, and the opportunity for employment and economic advancement by working in the industry. For these reasons government and private agencies sometimes promote a specific region as a tourist destination and support the development of a tourism industry in that area. The contemporary phenomenon of mass tourism may sometimes result in overdevelopment; however alternative forms of tourism such as ecotourism seek to avoid such outcomes by pursuing tourism in a sustainable way.

Dibrugarh Region offer great potential for tourism development. According to the existing scenario analysis, it has been observed that the following categories of tourism have immense potentialities for this region:

- Nature based outdoor recreation and Eco-tourism for Tea estates, botanical garden, forest, riverfront and vast agricultural area/ village settlements with undulating landforms including picnic spots, sightseeing, camping sites etc. Presence of all these tourism products calls for the growth of Adventure Tourism.
- Religious Tourism with historically important structures such as temples and other outdoor worshipping areas in the vicinity.
- Heritage Tourism with old architectural building, British dynasty build old Dibrugarh Town Railway Station and annual/ seasonal traditional village fairs and festivals, folk or tribal socio-cultural events with arts, crafts, music, dance etc.

5.10.6.1 Common Strategies

- Promote Homestays to help tourists experience Dibrugarh's culture.
- The Dibrugarh Govt. wants to boost tourism in Dibrugarh. As part of this, they intend to promote homestay, heritage and spiritual Tourism circuit in the DMPA.
- Targeting the middle and upper middle-class tourists, the homestay units are proposed which will enable them to experience Dibrugarh hospitality, cuisine, customs and traditions by staying with families.
- This system will benefit the owner of the house and make it easy for tourists who find it difficult to get hotel accommodation in peak season.
- Under the Heritage Circuit the following works can be taken up:
- Revitalization of streetscapes in the Heritage Area in Dibrugarh.
- Beautification and improvement of HS Road and New Market Road, BNP Road, Cole Road in Dibrugarh being a major commercial center of city.
- Beautification of DPT Canal passing through core city area of Dibrugarh.
- Toilet facilities to be provided at tourist spots.
- As part of the Spiritual Circuit project, development of infrastructure in key temples such as Jagannath Temple, Radha Krishna Temple and Ganesh Temple (Naliapool), and Jallan Temple.
- Public toilets at every major junction and public gathering spots as well as developing areas are to be provided for public convenience. It is to be provided especially in area where the tourists inflow is higher so that it can be utilized fully.
- Guided boat rides on the river could be provided to the resort guests who show a preference for it. Angling kit could be provided too for those who wish to amuse themselves with on-board fishing.
- By providing suitable incentives, encourage setting up at choice locations a few beer pubs which have aesthetic and upscale ambience. Tourists and commercial travelers who do not take up hotel accommodation during their visit to Dibrugarh are likely to patronise such bars.
- Establishment of budget accommodation at one or more suitable locations to cater to the short-period lodging facilities required by visiting artists for participation in the cultural / fine arts / religious festivals, pilgrims, sports persons, student groups / others may be examined by the tourism authorities. Alternatively, like the Grey-hound bus stations in the USA, locker-chests and wash facilities may be provided for those who opt for these amenities only instead of room accommodation.
- Establishment of "My Bike, My City " concept to help visitors explore the entire city and tourist spots independently by promoting e-Bicycle concept locally.
- None of the leading national hospitality chains such as the Taj, Oberois, Leela group and ITC hotels division have yet to come to Dibrugarh. Presence of quality national and international hotel chains will not only attract the high spending domestic / foreign tourists but also attract business conferences / seminars / workshops etc. Suitable steps may be taken in this regard by the authorities concerned to promote holding of conferences / seminars etc in the better class Dibrugarh hotels / resorts.
- Development of Science City, District Zoo, International Stadium, Golf Clubs, River Front, Amusement Park, Water Sport Complex and International Hospitality Chains will probably help.

5.10.7 INTEGRATED APPROACH FOR DEVELOPMENT OF TOURISM

- Regulating and planning for Tourism to preserve ecology, environment and areas of tourism value.
- Reducing pressure on Dibrugarh city by planning, developing self-contained state of art Tourist destinations in the surrounding settlements.
- Eliminating haphazard and unplanned/ sub-standard development around sites of tourism value.
- Promote Dibrugarh as a Quality Tourist destination rather than as a mass tourist place.
- Leveraging the concept of Eco-Tourism for the development of places of tourist value.
- Leveraging Tourism for promoting and enhancing the state economy and generation of employment.
- Planning tourism supportive infrastructure with care and put in place on priority in order to exploit the full potential of tourism.
- Planning and developing state of art Convention Centres and supportive facilities to make Dibrugarh Global Convention Hub.
- Making adequate arrangements for parking as part of the planning tourist sites.
- Planning the circulation pattern for tourist in such a way that City tours can be held for tourists visiting the local sites of heritage value.
- Making Provisions for Public Transportation so that City Bus Tours can be taken up to promote tourism within the city and to minimize traffic on the roads.
- Leveraging strength of Boats to start city tours involving various water bodies, lakes and rivers.
- Coordinated Marketing to attract more tourists from other states and foreigners.
- Enhancing Product Quality so as to create a brand image for tourist destinations and enhancing service quality.
- Enabling Private Sector Participation for accelerated growth of the industry and efficiency in facilities and services.

5.10.8 HERITAGE MANAGEMENT AND ORGANIZATIONAL STRUCTURE

There is a need to setup a Heritage Committee for Dibrugarh Panning Area. The concerned Development Authorities/municipalities as well as local stakeholders, NGOs have significant role to play in successful implementation of strategies proposed for Dibrugarh's Areas.

Formulations of special regulations to control or mediate development within the available heritage areas are a prerequisite for effective implementation of the proposed recommendations. Special regulations for all development within heritage areas, including new construction, demolition or modification to existing buildings around historic structures or within historic precincts must be formulated by the concerned authority with the advice of Heritage Committee.

Detail plans must be prepared by respective development Authorities and Municipalities. It is necessary to prepare an inventory of built, cultural and natural heritage resources of the special areas. The inventory must include both protected and unprotected resources. the cost for most of the new developments in special heritage areas is already covered in budget allocation for 'Tourism, Recreation and Culture' and hence not included in this table. Estimates for projects those are specific for preservation of heritage resources are only included. River Front Development is treated as a separate item of budgetary allocation.

5.10.9 HERITAGE CONSERVATION PROPOSAL*Heritage Conservation process*

Where to start	Institutional setup	Special Control Areas
<ul style="list-style-type: none"> • Listing of buildings • Locating on city map • Form clusters of significant buildings • Name as Heritage Zone/ Conservation Zone 	<ul style="list-style-type: none"> • Institutions responsible for maintenance – ULB, PPA, TCPD, ASI, state Depts. • Inter institution linkages – ULB, ASI, INTACH • Heritage Cell • Civil society groups/industrial house 	<ul style="list-style-type: none"> • For heritage structures and precincts • Controlled Development • Heritage Conservation Committee

Heritage Conservation Chart

The primary objective of listing is to record extant architectural heritage and sites and the outcome of this process should invariably be to grade the heritage by a multidisciplinary team of experts whose recommendations should be available for public stakeholders and they can assess those for further changes if required. The importance of this process cannot be underestimated because its results determine subsequent conservation decisions and it facilitates the prioritisation of decisions relating to the future of architectural heritage and sites.

Listing does not prevent change of ownership or usage but change of use of such Listed Heritage Building / Listed Precincts is not permitted without the prior approval of the Heritage Conservation Committee. Listed Heritage Buildings / Listed Heritage Precincts may be graded into three categories. The definition of these and basic guidelines for development permissions are as follows:

Grade-I	Grade-II	Grade-III
(A) Definition: Heritage Grade-I comprises buildings and precincts of national or historic importance, embodying excellence in architectural style, design, technology and material usage and/or aesthetics; they may be associated with a great historic event, personality, movement or institution. They have been and are the prime landmarks of the region. All-natural sites shall fall within Grade-I.	Heritage Grade-II (A&B) comprises of buildings and precincts of regional or local importance possessing special architectural or aesthetic merit, or cultural or historical significance though of a lower scale than Heritage Grade-I. They are local landmarks, which contribute to the image and identity of the region. They may be the work of master craftsmen or may be models of proportion and ornamentation or designed to suit a particular climate.	Heritage Grade-III comprises building and precincts of importance for townscape; that evoke architectural, aesthetic, or sociological interest through not as much as in Heritage Grade-II. These contribute to determine the character of the locality and can be representative of lifestyle of a particular community or region and may also be distinguished by setting, or special character of the façade and uniformity of height, width and scale.
(B) Objective: Heritage Grade-I richly deserves careful preservation.	Heritage Grade-II deserves intelligent conservation	Heritage Grade-II deserves intelligent conservation (though on a lesser scale than Grade-II and special protection to unique features and attributes).
(C) Scope for Changes: No interventions be permitted either on exterior or interior of the heritage building or natural features unless it is necessary in the interest of strengthening and prolonging the life of the buildings/or precincts or any part or features thereof. For this purpose, absolutely essential and minimum changes would be allowed and they must be in conformity with the original.	Grade-II(A) : Internal changes and adaptive re-use may by and large be allowed but subject to strict scrutiny. Care would be taken to ensure the conservation of all special aspects for which it is included in Heritage Grade-II. Grade-II (B) : In addition to the above, extension or additional building in the same plot or compound could in certain circumstances, be allowed provided that the extension / additional building is in harmony with (and does not detract from) the existing heritage building(s) or precincts especially in terms of height and façade	Not Requires
(D) Procedure: Development permission for the changes would be given on the advice of the Heritage Conservation Committee.	Development permission for the changes would be given on the advice of the Heritage Conservation Committee.	Development permission for changes would be given on the advice of the Heritage Conservation Committee.
(E) Vistas / Surrounding Development: All development in areas surrounding Heritage Grade-I shall be regulated and controlled, ensuring that it does not mar the grandeur of, or view from Heritage Grade-I.	All development in areas surrounding Heritage Grade-II shall be regulated and controlled, ensuring that it does not mar the grandeur of, or view from Heritage Grade-II	All development in areas surrounding Heritage Grade-III shall be regulated and controlled, ensuring that it does not mar the grandeur of, or view from Heritage Grade-III.

Source: CPWD

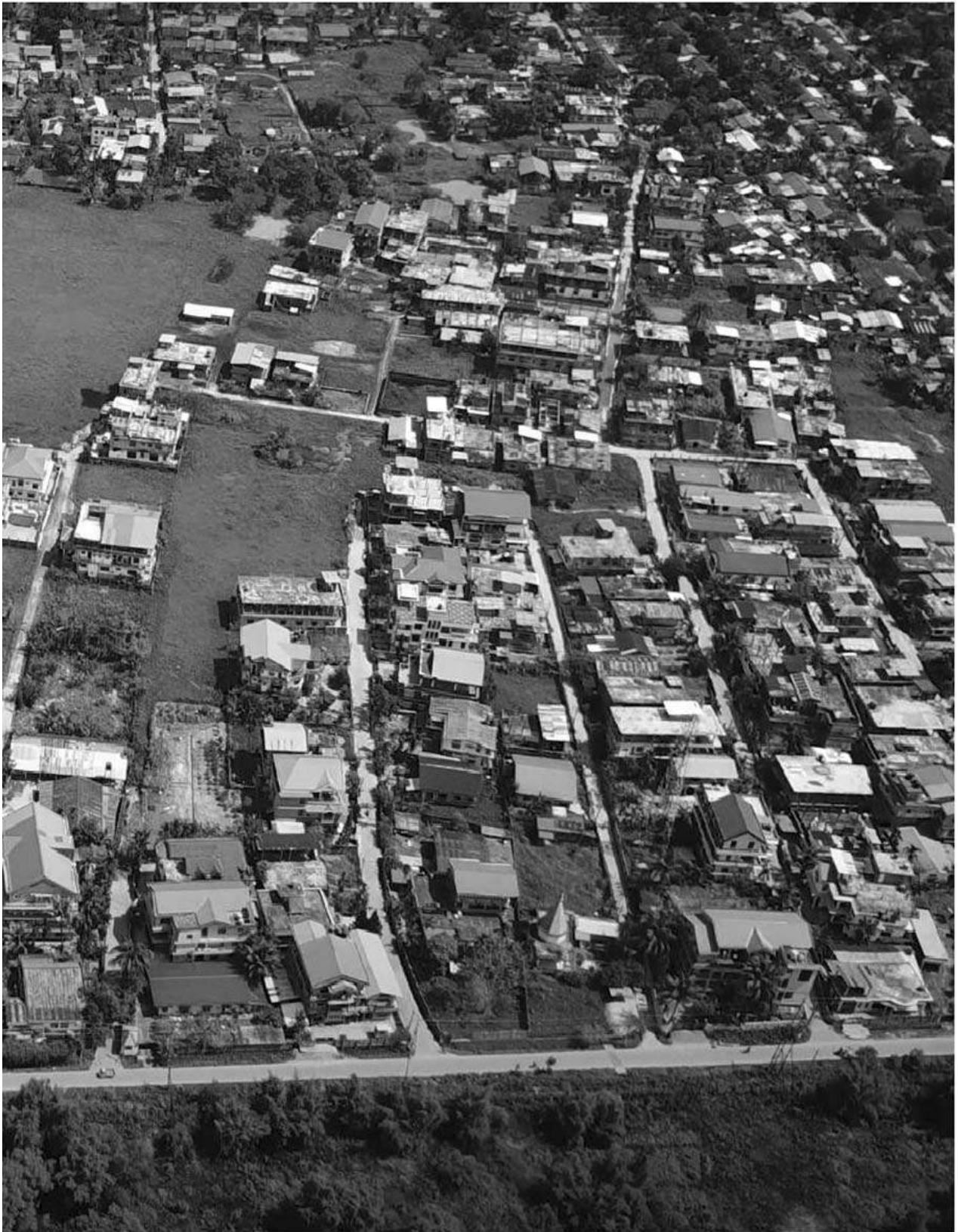
For the conservation of heritage buildings, the abovesaid steps are to be followed.

6 HOUSING

Housing sector is employment intensive; it generates employment during its construction period and, during its life for maintenance purpose. The United Nations Centre for Human Settlements (UNCHS) uses a broader term "Settlement conditions" because it extends to all those components of the physical environment with which an individual or a community comes into contact and which are used on a regular basis for the whole range of human activities - the individual dwelling and its related services, the dwelling's immediate surroundings, community facilities, transportation and communications network and so on.

This section of the report reviews the housing profile in the project area. Census 2011 housing data had used to analyze the profile. Analysis of the Dibrugarh urban area includes Mohpuwalimora Gohain Gaon (OG), Tekela Chiring Gaon (OG) outgrowth area, Niz-Mancotta (CT) and Barbari AMC (CT) census town area. In addition, number of household data of other rural centers falling within the project area is available but rest of the housing parameters are available only for Dibrugarh MB and OG area; hence, not all housing parameters were analyzed for other rural centers then DMB and Out Growth.





6.1 EXISTING HOUSING SCENARIO

In today's context, perhaps the most important issue for urban dwellers is to find an appropriate place to live. It is observed that the price of all kind of housing have been increasing exorbitantly, which indicate that the investment in housing sector is unable to match pace with the increasing demand for housing. Rapid urbanization and rural to urban migration have led to a substantial shortage of housing in the region. The direct result of this is the concentration of informal settlements in the city. Given that the shortage in housing is concentrated at the bottom of the pyramid, the sector can play an important role in the socioeconomic development.

Moreover, with the rapid urbanization and significant increase in the housing demand, housing sector is the engine of immense potential of giving a push to the economy because of its link with the employment generation and livelihood. Therefore, provision of housing can make a significant difference in income of families, both in rural and urban areas. The number of households in Dibrugarh MPA for year 2011 is given.

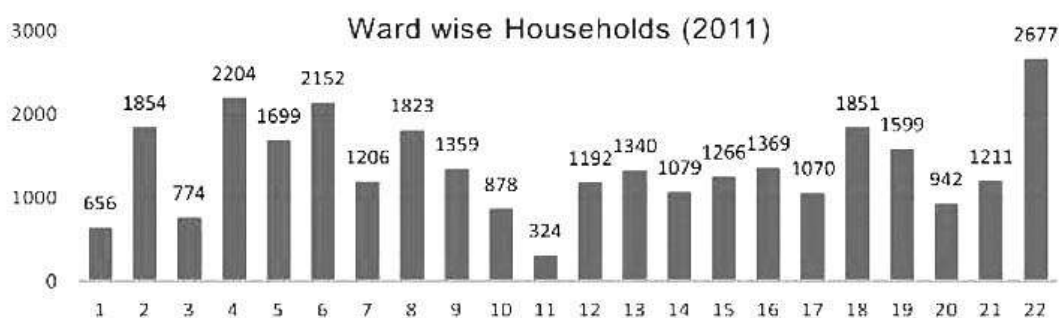


Figure 71 Ward wise Household data in year 2011



Table 80 Municipal Board area

Ward No.	Population (2011)	No. of Households	Housing size
1	3032	656	4.6
2	7974	1854	4.3
3	3375	774	4.3
4	9172	2204	4.1
5	7046	1699	4.1
6	9005	2152	4.1
7	5214	1206	4.3
8	8446	1823	4.6
9	7017	1359	5.1
10	4336	878	4.9
11	1934	324	5.9
12	5371	1192	4.5
13	5860	1340	4.3
14	4824	1079	4.4
15	5403	1266	4.2
16	7419	1369	5.4
17	5629	1070	5.2
18	8687	1851	4.6
19	7047	1599	4.4
20	4207	942	4.4
21	5507	1211	4.5
22	13060	2677	4.8
Total	139565	30525	4.5

(Source: Compiled by Consultant)

The table 80 depicts the ward wise population and total number of households in Dibrugarh Municipal Board area. The maximum number of households are in Ward no. 22 followed by Ward no. 4 and 6. The minimum number of households are in ward no. 11. Based on the population and households, the housing size is calculated. The overall housing size is **4.5** which is calculated from the ward wise total population and total number of households. The maximum housing size observed in Ward no. 16 and 17 which is 5.4 and 5.2, respectively. The minimum housing size is 4.1 which is in ward numbers 4, 5, 6.

Table 81 Existing households in Outgrowth and Census Towns

Name of OG / CT	Population 2011	No. Of Household	Housing size
Mohpuwalimora Gohain Gaon (OG)	1425	300	4.7
Tekela Chiring Gaon (OG)	4498	1027	4.3
Niz-Mancotta (CT)	5924	1341	4.4
Barbari AMC(CT)	2884	626	4.6
Total	14731	3294	4.4

(Source: Compiled by Consultant)

This table 81 describes the existing households in Outgrowth and Census Town area as per Census 2011 and from this the housing size has been calculated which turns out to be 4.4 on an average. Housing size observed maximum in Mohpuwalimora Gohain Gaon (OG) which is 4.7 followed by Barbari AMC Area (CT) which is 4.6, it is 4.4 in Niz-Mancotta (CT) and 4.3 in Tekela Chiring Gaon (OG).

Table 82 Existing households in Rural area

Name	Population 2011	No. Of Household 2011	Housing size
Rural Housing within DMPA	2,07,101	43,017	4.8

(Source: Compiled by Consultant)

The population in DMPA's rural region is 2,07,101 and the total number of households are 43,017. The Household size observed in this region is 4.8

6.1.1 HOUSEHOLDS IN DMPA

In DMPA, the area wise household details are as mentioned below

Table 83 Existing households in Dibrugarh Master Plan Area for 2045

Sl.No.	Name of Area	Population	No. Of Household	Percentage	Household size
1	Dibrugarh Municipal Board (22 Wards)	139565	30525	37.98%	4.5
2	2 (Two) OG & 2(Two) CT	14731	3294	4.70%	4.4
3	13 Semi-Urbanised villages from Dibrugarh East & West Rev. Circle	31207	6878	8.63%	4.5
4	53 villages from Dibrugarh East Rev. Circle	75921	15819	21%	4.8
5	115 villages from Dibrugarh West Rev. Circle	99518	20231	27.53%	4.9
6	2 villages from Moran Rev. Circle	455	89	0.16%	5.1
Total for GIS base Dibrugarh Master Plan Area		361397	76836	100%	4.7

(Source: Census of India 2011, Compiled by Consultant)

Households in Dibrugarh MPA

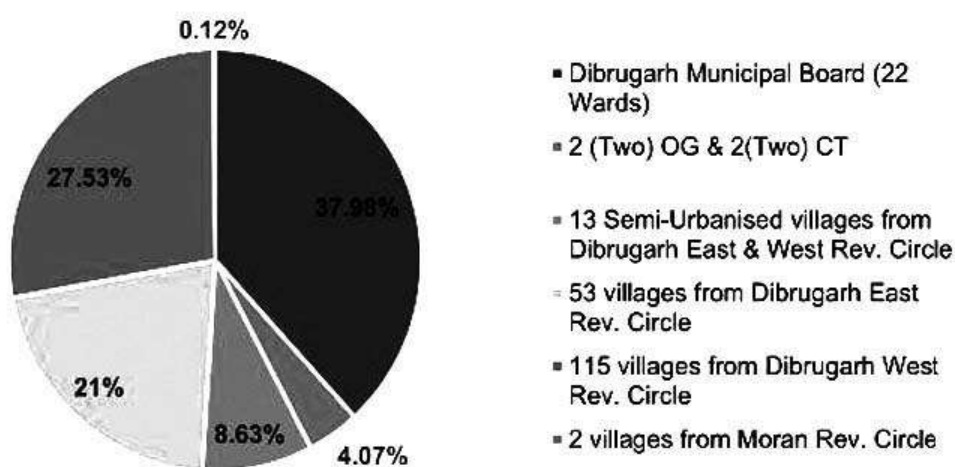


Figure 72 Existing Households in Dibrugarh Master Plan Area

The table 83 indicates total population in DMPA is 361397 and the No. of households are 76,836 which further leads to the overall household size 4.7. The maximum population is in DMB area which is 139565 and contributes 37.98 % of total DMPA. The lesser number of households observed in 2 villages from Moran Rev. Circle and OG and CT area which is 0.12% and 4.07% respectively.

6.1.2 SIZE OF THE HOUSEHOLD

The 1991 Census reveals that more than half of the households in the region were medium sized with an average member of 3 to 5. According to census 2011 the medium sized households (4-5) is predominant because of the increasing trend towards nuclear households. Since the trend in nuclear households and rapid urbanisation are at higher rate, there will be considerable pressure on housing in coming future. The overall household size of the Dibrugarh Planning Area is **4.7**. HH size is lowest in Outgrowth and Census Town area which is 4.4 and highest in Moran areas which is **5.1**.

6.1.3 HOUSING TYPOLOGY

The 'Housing Typology' is the complex nature of regional contexts as places to formulate human habitation. Investigating the interdependencies evolving between a building's entity and its territory can contribute in the future to development of region. Permanent houses are those with wall and roof made of permanent materials. Wall can be made of G.I., Stone packed with Mortar, Stone not packed with Mortar, Metal, Asbestos sheets, burnt bricks, Stone or Concrete. Roof can be made of Hand-made tiles, Machine made tiles, Slate, G.I., Metal, Asbestos sheets, Brick, Stone or Concrete. Semi-permanent houses are those in which either wall or roof is made of permanent material and other is made of temporary material. Temporary houses are the ones with wall and roof made of temporary material. Wall can be made of Grass, Thatch, Bamboo etc., Plastic, Polythene, Mud, Unburnt brick or Wood. Roof can be made of Grass, Thatch, Bamboo, Wood, Mud, Plastic or Polythene. Table 84 reveals the number of households living in permanent, semi-permanent and temporary houses within the DMPA. Out of 76,836 households, 44.35% are permanent, 47.57 % are semi-permanent and 8.08% are temporary houses.

Table 84 Distribution of households living in permanent, semi-permanent and temporary houses

Particular		Permanent	%	Semi-permanent	%	Temporary	%
Urban	Dibrugarh MB	19,292	63.2	10012	32.8	1160	3.8
	Census Towns (CT)	1199	61	590	30.1	178	9.04
	Outgrowth (OG)	807	60.85	493	37.15	27	2
Rural	Rural areas	12,683	29.7	25546	59	4849	11.2
	Total	33,981	44.35	36,641	47.57	6,214	8.08

(Source: District Census Handbook, Dibrugarh, Village & Town wise Primary Census Abstract 2011)

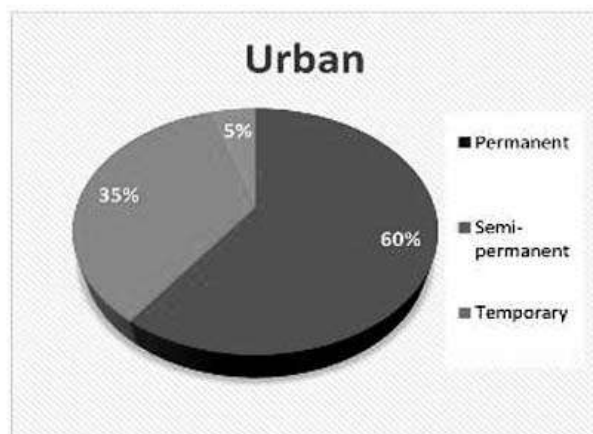


Figure 73 Urban Housing Typology in Dibrugarh Planning

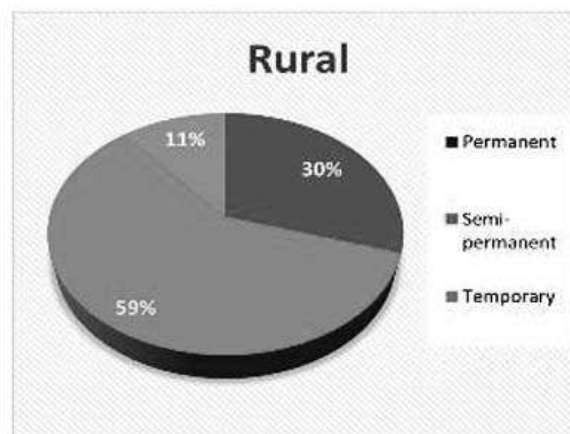


Figure 74 Rural Housing Typology in Dibrugarh Planning

The figure 73 indicates that around 60% are permanent households, 35 % are semi-permanent and 5% of dwelling units are temporary units in Dibrugarh urban area. In rural areas, the percentage of permanent housing is 30%, semi-permanent housing is 59% and temporary housing units are around 11%. It is also being observed that in rural areas 11% of total households are temporary houses. This clearly indicates that focusing the housing development in rural areas is of importance in order to provide basic need of the people.

6.1.4 HOUSING CONDITION

Housing Condition includes the study of condition of housing based on type of structure i.e. permanent/ semi- permanent, physical infrastructure, mass space relationship, condition of the material used for walls and floors etc. It is important to be studied because it indicates the efficiency and sustainability of the housing stock, whether the houses are liveable or not. Based on the above said parameters, the condition of houses has been segregated and the analysis is done as good, livable and dilapidated houses.

Table 85 Housing Conditions

Area	Residence (%)				Residence-cum-other use (%)			
	Total	Good	Livable	Dilapidated	Total	Good	Livable	Dilapidated
Assam	6,272,151	33%	56%	11%	95,144	30%	62%	8%
DIB District	2,67,486	45%	49%	6%	4,893	40%	56%	4%
DMB+OG	30,890	62%	33%	5%	977	52%	43%	5%

(Source: Census of India 2011)

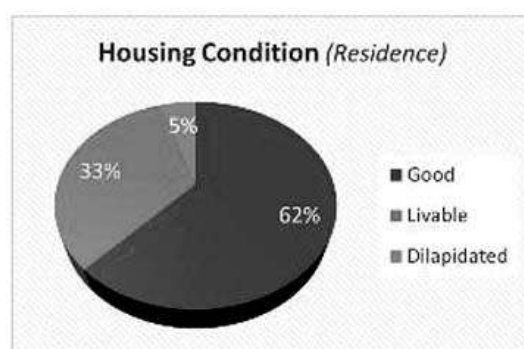


Figure 75 Housing condition as per Census 2011

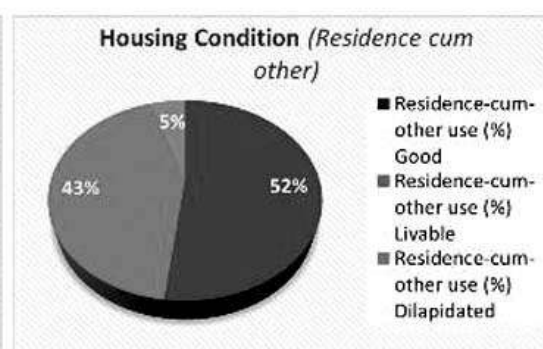


Figure 76 Housing condition in other use Census 2011

Table 86 Slum Housing Conditions

Area	Residence (%)				Residence-cum-other use (%)			
	Total	Good	Livable	Dilapidated	Total	Good	Livable	Dilapidated
Assam	6,272,151	33%	56%	11%	95,144	30%	62%	8%
DIB District	2,67,486	45%	49%	6%	4,893	40%	56%	4%
DMB+OG	5,548	49%	42%	9%	204	56%	39%	5%

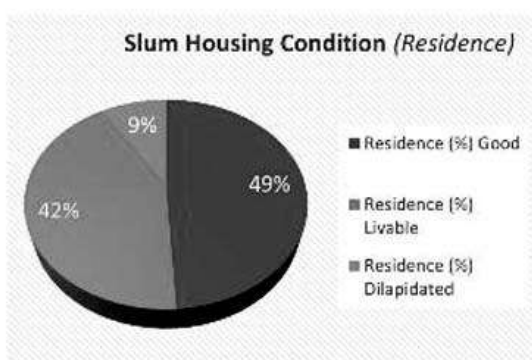


Figure 77 Slum Housing condition as per Census 2011

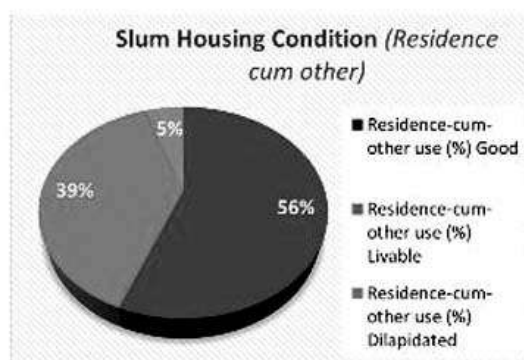


Figure 78 Slum Housing condition in other use Census 2011

In 2011, out of total 31,867 occupied housing units in DMB+OG, 30,890, units are exclusively residential and 977 are used for residence-cum-other uses. Out of total residential housing units, majority units are in good condition and livable, while only 5% are in non-living condition. Ratio of housing units in good condition is much higher in DMB+OG (62%) as compare the share of good conditioned occupied housing units in the state (33%) and district (45%). However, the share of livable housing condition in the state and in the district is much higher as compared to the DMB.

In slum houses category, houses in good condition which are 49% followed by houses in liveable condition which are 42% and the least are in dilapidated condition which are 9%. Also, the condition of houses mentioned for the residential cum other use of slum houses, where only 5 percent are in dilapidated condition.

6.1.5 CONSTRUCTION MATERIAL OF HOUSES

6.1.5.1 Material of Roof:

Majority of households in the region have G.I. Metal sheets for roofing because they are great protection against rain, and is easily available in the region. In DMB area, around 70.26% of houses have G.I. Metal sheet roofs, which is still comparatively low numbers than the states (74.2%).

Table 87 Material of Roof

Area Name	Total number of HHs	Grass/ Thatch/ Wood/ Mud	Plastic Poly thene	Hand made Tiles	Machine made Tiles	Burnt Brick	Stone/ Slate	G.I./Metal/ Asbestos sheets	Concrete	Any other material
State	6,367,295	8.60%	2.10%	0.70%	0.30%	0.10%	0.80%	74.20%	12.90%	0.20%
District	2,72,941	9.56%	0.32%	0.35%	0.05%	0.26%	1.94%	71.87%	15.10%	0.55%
DMB+OG	32,046	3.62%	1.30%	0.35%	0.14%	1.01%	5.61%	70.26%	17.26%	0.09%

(Source: Census of India 2011)

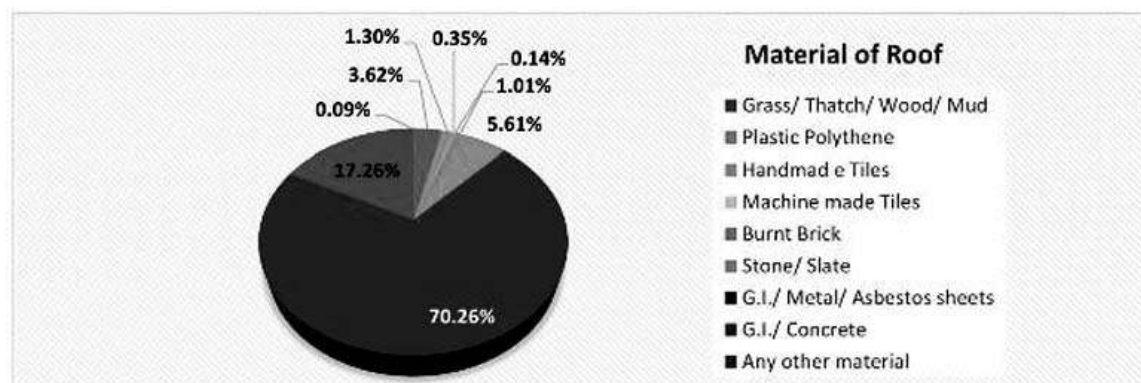


Figure 79 Housing by Material of Roof

In the districts 71.87%, households have the same roofing material. At the same time, around 17.26% households in DMB have the permanent roofs made of concrete; the number is comparatively higher than the number of households with the permanent roofs in the state and the districts.

6.1.5.2 Material of Wall:

Table 88 Material of Wall

Area Name	Grass/ Thatch/ Bamboo etc.	Plastic/ Polythene	Mud/ Unburnt brick	Wood	Stone not packed with mortar	Stone packed with	G.I./ Metal/ Asbestos sheets	Burnt brick	Con crete	Any other material
State	66.40%	0.60%	3.60%	1.60%	0.70%	1.40%	1.10%	21.20%	2.90%	0.50%
District	59.92%	0.41%	2.38%	0.31%	0.68%	1.98%	0.24%	32.68%	1.30%	8.37%
DMB+OG	33.96%	0.94%	3.16%	0.99%	2.40%	6.97%	0.71%	45.84%	4.91%	2.54%

(Source: Census of India 2011)

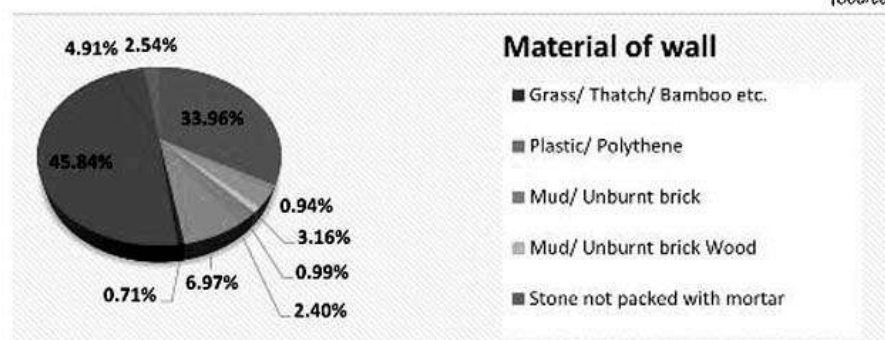


Figure 80 Housing by Material of Wall

Majority of houses in DMB and OG are Pucca houses with walls made of either burnt bricks (45.84%). Houses made with bamboos and thatch is the second majority in DMB area (33.96%). However, on the other hand, majority of houses in the state (66.4%) and in the district (59.92%) are Kachha houses with the walls made of grass, bamboos and thatch.

6.1.5.3 Material of Floor:

In DMB and OG, cement is predominantly used material for flooring. Almost 59.20% households in DMB and OG have permanent flooring made of cement, and only 30% houses are with flooring made of mud, especially in the slums and other low-income group areas. On the other hand, at the state and the district levels, mud is the predominant flooring material widely used. Majority of households in the state (79%) and in the district (71%) have floor made of mud. Wood, bamboo, store, and mosaic tiles are other flooring materials used for flooring in the region.

Table 89 Material for Flooring

Area Name	Mud	Wood/ Bamboo	Burnt Brick	Stone	Cement	Mosaic/ Floor Tiles	Any other material
State	78.6%	2.1%	1.2%	0.4%	16.6%	1.0%	0.1%
District	71.43%	1.10%	2.56%	0.59%	22.87%	1.39%	0.05%
DIB MB+OG	30.72%	1.07%	1.59%	0.82%	59.20%	6.43%	0.17%

(Source: Census of India 2011)

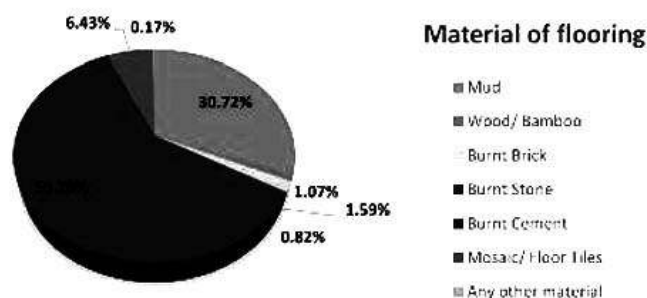


Figure 81 Housing by Material of Flooring

6.1.6 OWNERSHIP STATUS OF HOUSES

According to census 2011, the housing sizes are classified as number of dwelling units with following categories.

1. Dwelling units with no exclusive rooms
2. Dwelling units with single room
3. Dwelling units with two and three rooms
4. Dwelling units with four and five rooms
5. Dwelling units with six and above rooms.

Table 90 Housing Ownership Urban area

Area Name	Ownership status	Total no. of households	Households having number of dwelling rooms						
			No exclusive room	One room	Two rooms	Three rooms	Four rooms	Five rooms	Six+ rooms
Dibrugarh (MB + OG)	Total	32046	436	6745	8037	6689	4475	2698	2966
	Owned	54.53%	42.20%	20.95%	41.88%	57.86%	80.16%	88.44%	90.02%
	Rented	38.23%	50.92%	72.50%	49.38%	30.75%	15.87%	9.19%	5.23%
	Any Other	7.24%	6.88%	6.55%	8.73%	11.39%	3.98%	2.37%	4.75%

(Source: Census of India 2011)

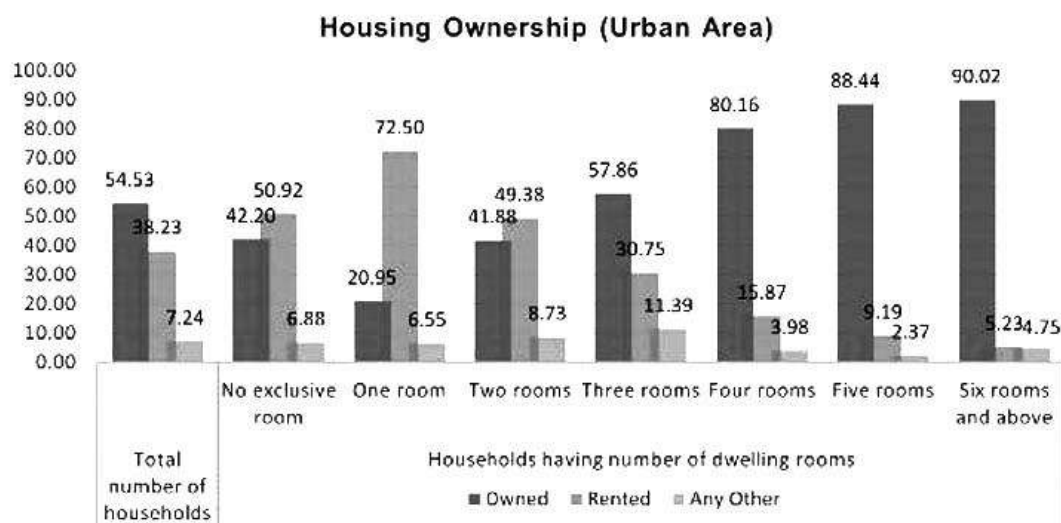


Figure 82 Housing Ownership by Dwelling Rooms

From the figure 83 it is observed that 21% of total households are owning single room and three-room units in the urban area while 25% households live in two room dwelling units. Out of 8037 two room units 41.88% are owned and 49.38% are on rent. It is also observed that 18% of the Households are living in five plus rooms where only 7.60% are rented and major units are under ownership status. In overall the 1% of the households are living without any exclusive room in urban area on the total urban households.

Urban Housing (by dwelling rooms)

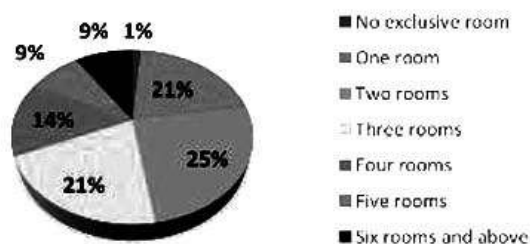


Figure 83 Housing ownership of dwelling in DMPA

Table 91 Housing ownership Rural Area

Area Name	Ownership status	Total number of households	Households having number of dwelling rooms				
			No exclusive room	One room	Two and Three rooms	Four and Five rooms	Six rooms and above
	Total	43293	199	1695	23376	14042	3981
Dibrugarh (Rural)	Owned	74.63%	49.25%	77.94%	81.79%	61.57%	78.47%
	Rented	22.68%	48.24%	19.35%	15.52%	35.74%	18.84%
	Any Other	2.69%	2.51%	2.71%	2.69%	2.69%	2.69%

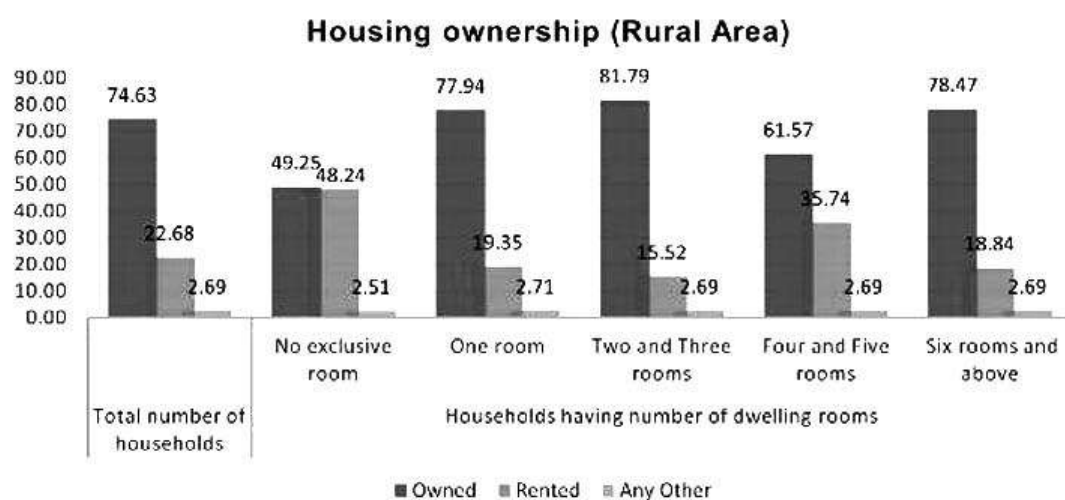


Figure 84 Housing Ownership by Dwelling rooms (Rural)

The figure 85 describes that 4% of total households are owning single room in the rural area while 54% households live in two and three-room dwelling units. Out of 23376 two-three room units 81.79% are owned, whereas only 15.52% are on rent status. It is also observed that 32% of the Households are living in four-five dwelling rooms where only 35.74% are rented and major units are under ownership. In overall the 1% of the households are living without any exclusive room in rural area on the total rural households.

Rural Housing (by dwelling rooms)

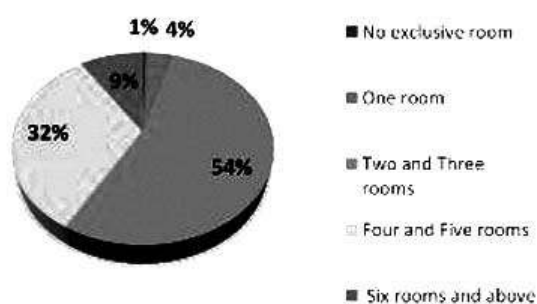


Figure 85 Housing ownership of dwelling in DMPA

Table 92 DMPA Housing Ownership by Dwelling Rooms

Area Name	Households having number of dwelling rooms (Excluding Vacant Houses)	Total number of households				
		No exclusive room	One room	Two and Three rooms	Four and Five rooms	Six rooms and above
DMPA	75339	635 (1%)	8440 (11%)	38102 (51%)	21215 (28%)	6947 (9%)

In DMPA, 51% are two and three-room dwelling units as majority followed by four and five room categories, while 1% not having any exclusive rooms. Overall, DMPA observes 66% housing under ownership status and very less under rent category status. 5% housing have not clear ownership status in DMPA.

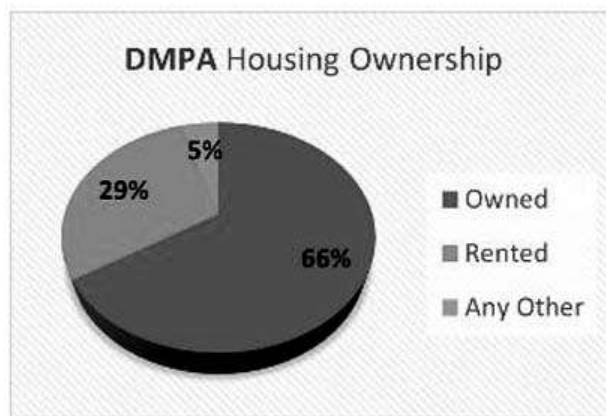


Figure 86 DMPA Housing Ownership

6.1.7 SERVICES

6.1.7.1. Source of Drinking Water:

On an average, more than half of the household in the region have source of drinking water within their premises. Water taps, wells, hand pumps, tube wells or boreholes are the primary sources of drinking water for households within-premises water facilities, while river, pond, lake, spring, and tank are the main drinking water source of water for them who do not have sources within their premises or nearby their premises and have to go little far.

Table 93 Source of Drinking Water

Total/ Rural/ Urban	Location	No. of Hhs	Main Source of Drinking Water							
			Tap	well	Hand Pump	Tube well/ Bore hole	Spring	River/ Canal	Tank/ Pond/ Lake	Others
State	Within the premises	55%	10%	17%	62%	11%	0%	0%	0%	0%
	Near the premises	27%	12%	19%	40%	8%	1%	5%	14%	2%
	Away	18%	9%	24%	31%	6%	5%	12%	5%	7%
District	Within the premises	68%	14%	3%	59%	24%	0%	0%	0%	0%
	Near the premises	26%	4%	4%	64%	24%	0%	1%	1%	3%
	Away	7%	7%	6%	50%	18%	1%	6%	2%	10%
DMB+OG	Within the premises	88%	31%	0%	32%	37%	0%	0%	0%	0%
	Near the premises	10%	8%	0%	52%	35%	0%	3%	0%	2%
	Away	2%	4%	1%	43%	44%	1%	3%	0%	3%

As compared to the state, both District and DMB have higher number of houses with the drinking facilities within in the premises. Majority houses in DMB have drinking water facilities within their premises. Unlike DMB where taps and tube wells are the primary source of water for the in-premises water facilities, hand pumps and tube well are the preliminary source of drinking water for the district.

6.1.7.2 Source of Lighting:

Around 90% of households in DMB and OG have electricity connection. Similarly, majority of households in other urban centers of the project area have electricity connection. However, at the state level, less than 50% household have electricity connection, which means electricity has not yet reached to the all-rural areas in the state, and kerosene is still being used as a main lightening source widely in Assam. In DMB, the main source of lightning is electricity, which mainly provided by Assam State Electricity Board.

Table 94 Source of Lighting

Area Name	No. of households	Main Source of Lighting					
		Electricity	Kerosene	Solar Energy	Other Oil	Any Other	No Lighting
State	6,367,295	37.0%	61.8%	0.8%	0.1%	0.1%	0.2%
District	2,72,941	50.08%	49.32%	0.20%	0.07%	0.07%	0.26%
DMB+OG	32,046	89.85%	9.41%	0.07%	0.13%	0.04%	0.49%
Other Urban Centers (CT)	1,922	89.07%	10.77%	0.05%	0.00%	0.05%	0.05%

(Source: Census of India 2011)

6.1.7.3 Type of Latrine Facility:

Around 98% of households in DMB and OG have latrine facility within the premises. Similarly, majority of households in other urban centers of the project area also have latrine facility within the premises. However, around 21% to 35% households in the State and District do not have latrine facilities within their premises. Septic tank is the most common type treatment for in-premises latrine facility found in the project area.

Table 95 Type of Latrine Facility

Area Name	Number of Hhs Having Latrine Facility Within	Type of Latrine Facility Within the Premises								Number of Hhs Not Having Latrine Facility	No Latrine Within Premises	
		Flush/Pour Flush Latrine Connected			Pit Latrine		Night Soil Disposed Into	Service Latrine			Alternative Source	
		Piped Sewer	Septic Tank	Others	Ventilated	Open Pit		Night Soil Remo	Night Soil service		Public Latrine	Open
State	65%	5%	15%	8%	10%	24%	1%	0%	1%	35%	2%	33%
District	79%	11%	29%	10%	14%	35%	1%	0%	1%	21%	10%	90%
DMB+OG	96%	24%	62%	5%	4%	3%	0%	1%	1%	4%	42%	58%
Other Urban Centers (CT)	98%	8%	81%	2%	2%	6%	0%	0%	0%	2%	0%	100%

(Source: Census of India 2011)

6.1.7.4 Type of Bathroom and Drainage Connectivity:

Over half of the households in the urban centers of the project area have bathing facilities within their premises. In fact, 83% households in DMB and OG have in-premises bathroom facility. On the other hand, 50% or more households in the State and the District do not have in-premises bathroom facility.

Except DMB, the rest of the region is facing issues due to the lack of properly planned drainage system (suffering from lack of planned drainage system) for wastewater discharge. However, the 76% of DMB and OG area has wastewater outlet connected to the drainage system, only 24% of the area has planned underground drainage system, and the rest of 52% area has open drainage system connected to the wastewater outlets from houses.

Table 96 Type of Bathroom & Drainage Facility

Area Name	Number of HHs having Bathing Facility within the Premises			Wastewater Outlet Connected to		
	Yes		No	Closed Drainage	Open Drainage	No Drainage
	Bathroom	Enclosure without roof				
Assam	24%	17%	58%	4%	17%	80%
District	36%	30%	35%	6%	34%	60%
DMB+OG	83%	10%	7%	24%	52%	24%
Other Urban Centre (CT)	79%	9%	12%	21%	61%	18%

(Source: Census of India 2011)

6.2 GROSS HOUSING DENSITY

Table 97 Gross Housing Density

Sr. No.	Name of Area	No. Of Household	Area (sq.km.)	Housing Density
1	DMB (22 Wards)	30525	15.50	1960
2	2 (Two) OG & 2(Two) CT	3294	8.53	386
3	13 Semi-Urbanised villages from Dibrugarh East & West Rev. Circle	6878	23.42	293
4	53 villages from Dibrugarh East Rev. Circle	15819	89.37	177
5	115 villages from Dibrugarh West Rev. Circle	20231	226.14	89
6	2 villages from Moran Rev. Circle	89	4.89	18
Total DMPA		76836	391	196

Cities in India tend to have highest housing density in the central area. The density often progressively falls towards outskirts of the city this phenomenon is produced by intermixing of land uses in the central area particularly commercial activities, with residences. Housing density is defined as the average number of houses in one square kilometre of land or total number of households per total area. The housing density is important to be studied in urban study because it describes the level of openness or congestion in an area in terms of built-up area and open areas with respect to total area. Analysis of housing density in Dibrugarh MPA has revealed the overall gross housing density as 196. The high housing density in Dibrugarh MB area is not a reflection of high-rise building but it is essentially due to the high occupancy rate and land coverage.



6.3 HOUSING TREND

Decadal Housing trend from year 1991 to 2011 for Dibrugarh Master Plan Area is given below. According to Census 2011, Municipal + OG area has less household requirement compared to rural area. Trend indicates the progressive fulfilment of household requirement from year 1991 to 2011.

Table 98 Housing trend according to decades

Year	1991				2001				2011			
Dibrugarh Planning area	Population	Households	Required Households for 1991	Shortage	Population	Households	Required Households for 2001	Shortage	Population	Households	Required Households for 2011	Shortage
Municipal - OG	120127	22512	25550	3047	126616	25013	26940	1627	145488	32046	32830	784
Census town	3080	605	605	0	6950	1103	1480	377	8808	1967	1874	-93
Rural	159293	29754	33892	4138	179487	34893	38169	3366	207101	43017	44064	1047
Total	282500	52869	60106	7237	313058	60939	66609	5670	361397	77030	78268	1238

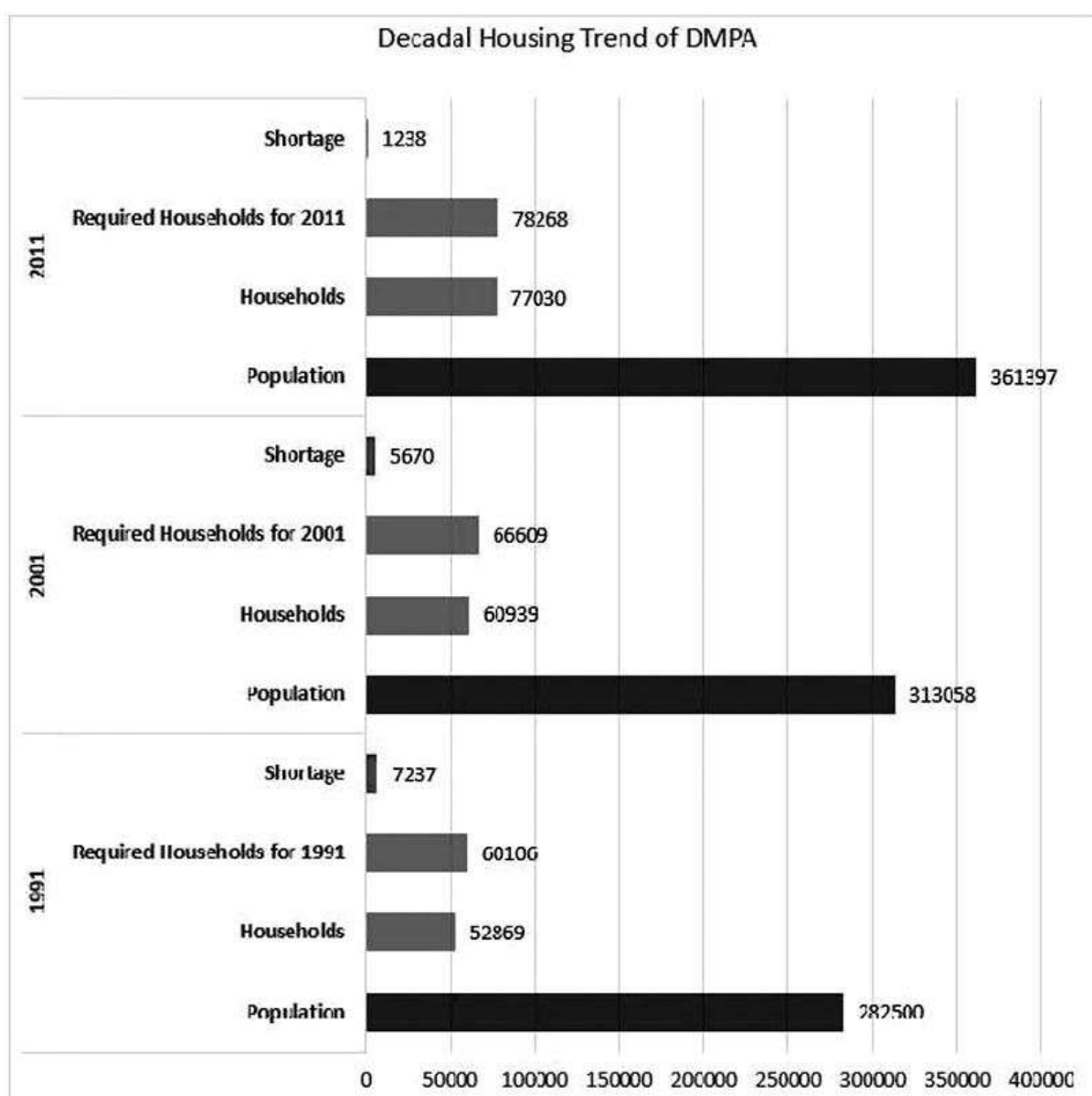


Figure 87 Decadal Housing Trend for the years 1991, 2001, 2011

6.4 GROWTH OF REAL ESTATE

The real estate sector is one of the most globally recognized sectors. In India, real estate is the second largest employer after agriculture and is slated to grow at 30 per cent over the next decade. The real estate sector comprises of further sub sectors like township, housing, retail, hospitality, infrastructure and commercial. The growth of this sector is well complemented by the growth of the corporate environment and the demand for office space as well as urban and semi-urban accommodations. The construction industry ranks third among the 14 major sectors in terms of direct, indirect and induced effects in all sectors of the economy. *(Source: Department of Industrial policy and promotion 2016)*

Dibrugarh region experienced almost 20% population growth between the census year 1991 and 2011. This increasing trend has resulted in promotion of huge amount of all kind infrastructure development in Dibrugarh Planning Area. With a fair infrastructure availability and being a trade gateway to Arunachal, Dibrugarh has opened an immense opportunity for Real Estate as a Holiday home market along with existing commercial & residential requirements of the region. Certain transportation connectivity improvement and development of rail-road corridor integrity helped by newly constructed Bogibeel Double Deck bridge has led to a boost in economic activity and in the real estate market of Dibrugarh. This will lead builders and developers from across the country investing in the Dibrugarh Planning Area. Moreover, the industrial infrastructure development carried out by BCPL has attracted investments to the region and has played a vital role in promoting industrial development of region and making it an attractive location for investors from across the country. The Government of India along with the governments of the surrounding states has taken several initiatives to encourage the development in the sector.

The real estate growth witnessed in the region is a result of the aforementioned reasons and it is poised to grow at a good pace with development initiatives taken by the Government of Dibrugarh and measures adopted as part of Master Plan 2045 which will open more residential properties for development along with industrial properties and Industrial corridors. With these proposals being adopted and implemented by the government, it will create an exponential growth in the real estate market of the Dibrugarh region. Hence based on the study of above facts, it indicates that there are 5 growth driven factors of Indian state's real estate. They are:

- Rapid Urbanisation
- Significant rise in consumerism
- Policy and regulatory reforms
- Surge in industrial and business activities
- Increasing demand for newer avenues for entertainment, leisure and shopping

Considering the above factors, the Real estate developers aim to utilise opportunities in line of market demand. Hence, these phenomena of possible development act as catalyst in the development process by creating more demand for residential and commercial area in the Planning Area. On the other hand, it gives boost to the property values and paves the way to keep the real estate sector vibrant in Planning Area. However, while this development is progressive for human beings, sociologist and ecologists are concerned about the fate of the agriculture land. More and more farmers of Dibrugarh region will be forced to sell their lands to builders as they pay lucrative amounts for the plots. Areas which were barren or even wetlands at one point are now seeing construction of residential or commercial buildings. Therefore, in order to bring the orderly development and to protect the fertile agricultural land, the Government of India has come up with "The Real Estate (Regulation and Development) Act, 2016".

6.4.1 THE REAL ESTATE (REGULATION AND DEVELOPMENT) ACT, 2016

The Real Estate (Regulation and Development) Act, 2016 is an Act which protects the interest of purchasers of plots and dwelling units / flats. It further helps to boost investments in the real estate industry. The Act mandates establishment of Real Estate Regulatory Authority (RERA) in each state for regulation of the real estate sector and also acts as an adjudicating body for speedy dispute redressal. The Real Estate Regulatory Authority regulates the real estate sector and ensures sale of plot, apartment or building, as the case may be, or sale of real estate project, in an efficient and transparent manner and also protects the interest of consumers in the real estate sector. The act has got provision for an adjudicating mechanism for speedy dispute redressal and also for establishment of Appellate Tribunal to hear appeals filed under the Act.

It is now a mandate for the city's real estate developers to register their projects under the Real Estate (Regulation and Development) (RERA) Act 2016, after the Assam Government notified the Act as Assam Real Estate (Regulation and Development) Rules 2017 in May, 2017.

6.4.2 SALIENT FEATURES OF THE REAL ESTATE REGULATION ACT (RERA), 2016

- The act establishes the state - level Real Estate Regulatory Authority for the regulation and promotion of the real estate sector, under section 20;
- The Act mandates prior registration of a project with the Real Estate Regulatory Authority under section 3(1). It also states that prior to registration no promoter shall advertise, market, book, sell or offer for sale, or invite persons to purchase in any manner any plot, apartment to building in any real estate project registering the real estate project with the Authority;
- The Act additionally provides for the registration of real estate agents by the real Estate Regulatory Authority under Section 34(a).
- The Act lays down the functions and duties of promoters under section 4, and under section
- It provides that once registration is applied for, RERA is given a time period of 30 days to either approve upon registration, the promoter shall be provided with a log-in and password to access the website of the authority, and shall create his web page on the website and enter the details of proposed projects;
- Under Section 4(2) (i) (d), it makes mandatory upon the promoters to deposit fund amounting to 70 per cent to over the construction cost of the project in a separate bank account to be maintained at a scheduled bank, to prohibit unaccounted money from being pumped in and out of the sector to the detriment of the consumer.
- The Act states, under section 4(2) (d), the project shall be developed by the promoter in accordance with the sanctioned plans, layout plans and specifications as approved by the competent authorities.
- Under Section 15(1), promoter shall not transfer or assign his majority rights and liabilities in respect of a real estate project to a third party without obtaining prior written consent from two-third allottees.
- Under Section 19, the Act provides for the rights and duties of allottees, like allottee shall be entitled to know stage-wise time schedule of completion of the project, right to claim the refund of amount paid along with interest and compensation in the manner as provided under the Act.
- Under Section 38(1), the Act provides for penalties and offences in case of violations of law by the promoters, allottees and the real estate agents.

6.4.3 NEED FOR HOUSING POLICY

Housing is an important economic activity besides being a necessity. As part of the construction industry, which accounts for more than 50 per cent of the development outlays, housing has emerged as a major sector of economy having backward and forward linkages with almost all other sectors. With the increasing urbanisation and rural to urban migration for employment, it becomes inevitable to provide basic infrastructure to people. Thus, to meet this demand, Government of India is introducing various policies like Pradhan Mantri Aavas Yojana (Housing for all), affordable housing policies etc. For the vulnerable and weaker sections of the society, the Government is playing the role of direct provider. A Centrally sponsored scheme called Valmiki Ambedkar Awas Yojana (VAMBAY) was launched with a view to ameliorating the conditions of the urban slum dwellers living below poverty line who have inadequate shelter. The scheme has the primary objective of facilitating the construction and upgradation of the dwelling units in the slum areas and to provide health and enabling urban environment through community toilets under Nirman Bharat Abhiyan, a component of the scheme. The scheme is being implemented through HUDCO.

The Pradhan Mantri Aavas Yojana is being implemented during 2015-2022 and provides central assistance to Urban Local Bodies (ULBs) and other implementing agencies through States/UTs for:

- In-situ Rehabilitation of existing slum dwellers using land as a resource through private participation
- Credit Linked Subsidy
- Affordable Housing in Partnership
- Subsidy for beneficiary-led individual house construction/enhancement

Credit linked subsidy component is being implemented as a Central Sector Scheme while other three components as Centrally Sponsored Scheme (CSS). All statutory towns as per Census 2011 and towns notified subsequently would be eligible for coverage under the Mission.

In the spirit of cooperative federalism, mission provides flexibility to the States for choosing the best options amongst four verticals of mission to meet the demand of housing in their states. Process of project formulation and approval in accordance with the mission Guidelines has been left to the States so that projects can be formulated, approved and implemented faster.

Recently, the government of India has also come up with the Draft Model State Affordable Housing Policy for Urban Areas in 2014. The aim of this policy is to "create an enabling environment for providing "affordable housing for all" with special emphasis on EWS and LIG and other vulnerable sections of society such as Scheduled castes/Scheduled Tribes, Backward Classes, Minorities and senior citizens, physically challenged persons in the State and to ensure that no individual is left shelter less. The Policy further aims to promote Public Private People Participation (PPPP) for addressing the shortage of adequate and affordable housing."

State government in order to achieve the central governments' goal of providing affordable housing for all under the Model State Affordable Housing Policy for Urban Areas.

The agencies responsible for various works to be implemented in Assam under majority of the central government's initiative are Town and Country Planning Department, Housing Board or Slum Board etc..

In Dibrugarh region, due to pressure in the urban areas, rampant development has taken place. Therefore, in order to have a streamlined growth in the coming future, Dibrugarh will require a Housing policy for the DMPA. Various Indian states like Madhya Pradesh, Chhattisgarh, Maharashtra, Karnataka etc. have introduced housing policy in order to have ordered development in the state. Thus, Assam Government shall also come up with a detailed Housing Policy. This policy should focus on various issues being faced by regions in terms of Housing.

It is noticed that a large number of unapproved layouts and sub-divisions have been developed in the Dibrugarh regions without adequate infrastructure and public civic amenities and most of the plots in such layouts and sub-divisions have been purchased by ignorant people and there is no way to convert these layouts and sub-divisions or plots back to their original land use;

Regularization of unapproved layouts will enable the purchasers to avail institutional finances to build houses at affordable interest rates and to improve their security of tenure and thereby their quality of life. It is also observed that regularisation of sold out plots alone without considering the layout or subdivision as a whole will result in discontinuous pockets of development, causing enormous difficulties to the Local Bodies to provide services to the regularised plots in isolation and therefore, it is considered necessary to regularise these unapproved layouts and sub-divisions in their entirety by insisting to widen the roads, improve circulation, reserve areas for open space and public purpose to the extent feasible in each layout.

Effect of regularization – Plots regularised under this scheme shall be deemed to be regularised for residential use.

Some imperative objectives of the Housing Policy to be formulated is described as under:

- To facilitate affordable housing in urban and rural areas, create adequate housing stock for Lower Income Group (LIG), Economically Weaker Section (EWS) and shelters for the poorest of the poor on ownership or rental basis.
- To pursue the target of cities without slums through equitable slum redevelopment and rehabilitation strategy and shelters for the poor.
- To deregulate housing sector and encourage competition and public private partnerships in financing, construction and maintenance of houses for Lower Income Groups (LIG) and Weaker Sections of the society.
- To rationalize development control regulations and streamline approval procedures.
- To promote rental housing and incentives to different options of rental housing for weaker sections.
- To facilitate the redevelopment and renewal of inner city areas and dilapidated buildings through options of land assembly; conserving heritage structures and places of archeological importance.
- Encourage technology innovation, training and capacity building of the construction workers to enhance their productivity and improve quality of housing stock.
- To promote larger flow of funds for investment in housing and infrastructure using innovative products and appropriate institutional mechanism.
- To encourage progressive shift from target orientation to a demand driven approach as also from a subsidy based housing scheme to cost sharing or cost recovery-cum-subsidy schemes.
- To provide for mandatory construction of EWS/LIG housing by the private sector in the government-provided land, government facilitated site or their own projects.
- The policy will orient towards setting up of a land bank to ensure smooth supply of land for projects specifically meant for construction of houses to low income segment households
- To create skilled manpower for building construction industry and create employment opportunity for low income group.
- To conserve ecologically sensitive areas and promote environmentally sustainable cities and townships.
- To establish Management Information System to strengthen monitoring of building activity in the Union Territory.

6.4.4 AFFORDABLE HOUSING POLICY

A policy document is a set of guidelines to direct the actions of all persons/ institutions involved or connected regarding any area of activity. Preparation of a housing policy is the need of the hour with respect to growing requirement of shelter and related infrastructure. As discussed in the previous section requirement for shelter is growing in context of rapid urbanization, migration to cities, mismatch between demand and supply of housing (especially affordable housing for EWS/ LIG), and inability of the urban poor to access the formal housing market to fulfil its housing need.

6.5 HOUSING STOCK AND SHORTAGE

Housing shortage is defined as the set of populations who does not hold any house. There may be a growing concern for homeless across big cities during winters, but progress in construction of night shelters has been very slow across most of the states despite the centre providing 75% of funds required for building and refurbishing shelters for the urban homeless. In absence of city level data on the houseless population and pavement dwellers, the houseless population is derived from the data published as part of Census of India, 2011. Details of housing stock, Municipal Board and urban centre wise, in DMPA were computed based on the Census of India, 2011 and are presented in the table 100.

Table 99 Housing Stock in DMPA 2011

Sl. No.	Dibrugarh Planning Area	No. Of Household 2011	Total no. of Housing Stock 2011	Housing Shortage
1	Dibrugarh Municipal Board (22 Wards)	30,525	29365	1160
2	2 CTs	1,922	1940	-18
3	2 OGs	1,372	1149	223
4	Rural	43,017	38168	4849
Total for DMPA		76,836	70,800	5,768

(Source: Compiled based on Census 2011)

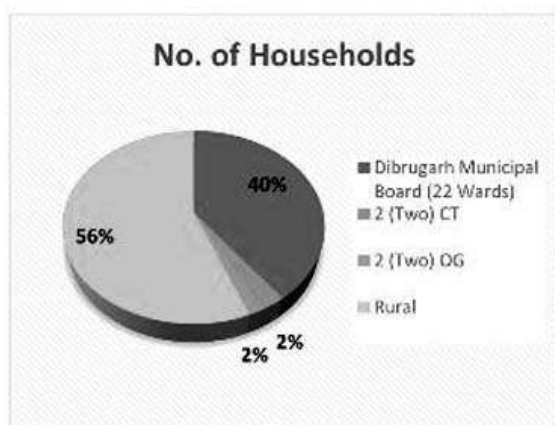


Figure 88 Total household region wise

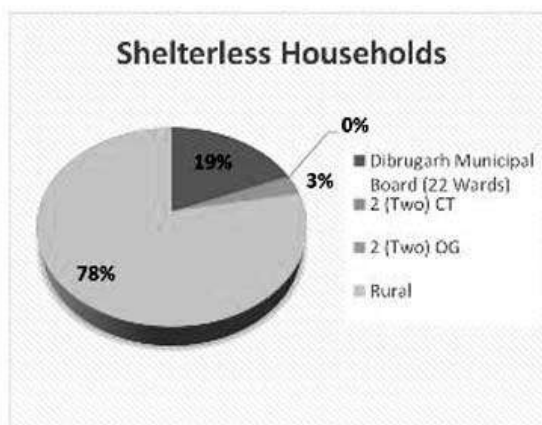


Figure 89 Shelterless household in DMPA



6.6 SLUMS

A Slum, for the purpose of Census, has been defined as residential areas where dwellings are unfit for human habitation by reasons of dilapidation, overcrowding, faulty arrangements and design of such buildings, narrowness or faulty arrangement of street, lack of ventilation, light, or sanitation facilities or any combination of these factors which are detrimental to the safety and health.

According to Census, slums are categorized into notified and identified slums. The high rate of growth of urban population and its accumulative nature with a population has led to increasing problem of housing, reducing privacy and overcrowding in small house, steady growth of slums and unplanned settlements and severe effect on civic services in urban areas in the system.

Slums can be commonly seen in urban areas which are occupied by urban poor or economically weaker sections of the society or the migrants from nearby villages or other states that come to the urban areas in search of employment in order to earn their livelihood. Slums are an indispensable part of our cities because as the cities grow, due to economic and physical growth of the urban area, people migrate from different areas in search of employment. So, to provide basic amenities to the urban poor and slum dwelling people this aspect needs to be incorporated while doing urban study to have an overall development of the city. Planning is for the people and in a way, slums are an indispensable part of the society. To make the city livable for all and to improve the condition of slums, this comprehensive study regarding slums plays a vital role in planning.

6.6.1 REASON FOR SLUM

The Dibrugarh region presents a wide range of activities in various institutional, Commercial and tourism sectors. Growth in such activities, possibilities of absorption in various service sectors, scope of employment in trade and business activities, hawking, retailing, carting etc., could have attracted more rural poor to the urban. Due to their economic status, these urban poor are unable to get a house within their limited income and hence occupy vacant spaces wherever available and lead a marginal level of living. These habitations in due course develop into slums proliferate exponentially further due to rapid urbanization and natural growth of population. In this scenario, the role of Government in tackling the slum becomes more pertinent.

6.6.2 IMPACT OF SLUM

The development of slums leads to Poor environmental conditions in such areas which lead to poor health, which aggravates poverty and often results in lower educational levels, as well as loss of income owing to sickness, disease, and increased spending on health care, which may deplete household savings. On the other hand, environmental problems exacerbate urban poverty and poor neighbourhoods suffer disproportionately from inadequate water and sanitation facilities and indoor air pollution. Poor people living in slum are often forced to live in environmental unsafe areas, steep hillsides and flood plains or polluted sites near solid waste dumps, open drains and sewers, and polluting industries. Conflicts like quarrel, clash and fight in the squatters of this area is a regular phenomenon. This creates noise and violence which leads to lack of security in the area and disturbs the city dwellers, particularly the nearby residents, office workers, and school children. Besides, many of the residents are involved in prostitution, drug trafficking, hijacking, smuggling etc. These activities threaten the social and cultural environment of the city.

6.6.3 SLUMS IN DMPA

As per Census 2011, there are 36,166 persons living in slums within Dibrugarh MB and OG area which is approximately 25%.

Table 100 Percentage of slum population from total population

Town Name	Total Population of Town	Slum Population	Percentage share from total population (%)
Dibrugarh (MB + OG)	145488	36166	24.85

6.6.4 NOTIFIED AND NON-NOTIFIED SLUM

Areas notified as slums by the respective municipalities, corporations, local bodies or development authorities are treated as “notified slums”. In any city, it is generally observed that the slum is developed mostly near their working places. Slum dwellers first prefer the location of land which is nearer to the workplace and then they prefer the location where basic amenities such as water, proximity to public transport etc. is available. That is why slums generally develop near the industries, wholesale-markets, godowns, railway stations and even in residential areas. They generally use public-transport or slow-moving vehicles such as cycle, rickshaws etc. as it is economical.

The figure 90 shows the location of notified and non-notified slums across the Planning area.

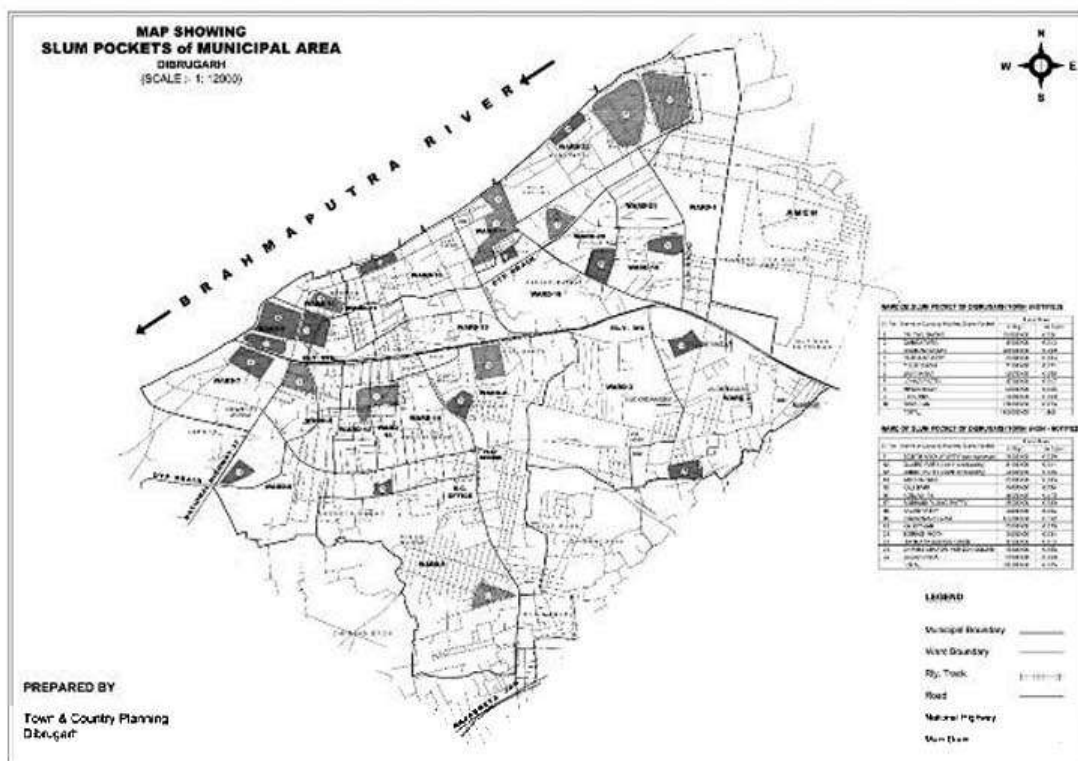


Figure 90 Notified and Non-notified slums area

Few notified slums are already situated within city area which are marked here in light green color polygons and non-notified slums are marked in red color polygons. The hygiene condition within slum area is degraded and major area is found with litters and thrown garbage. Open channel sewerage is a part of slum which also spills over with garbage at some places. Some patch of slum area along riverbank is non notified as they are accompanied by legal properties. Owing to slum area the premises is lacking in fundamental amenities of sanitation and hygiene. The area is on the rudimentary level of development.

The table 101 shows the details of slums which includes the name of slums, the land ownership status, total area, population, and number of households. According to the T&CP data, there are 10 notified slums in the town and 14 non-notified slums. The total area constituted by slums is 1.98 sq.km. with total population of 36,166.

Table 101 Slum population and housing details

Sl. No.	Name of the Slum	Ownership of land where slum is located	Area (sq. km.)	Slum Population	No. of Slum Household
Notified Slum					
1	Paltan bazaar	04	0.234	4062	790
2	Gangapara	04	0.043	1022	240
3	Graham bazaar	01	0.259	5658	1095
4	Pathan patti	04	0.083	511	102
5	Tulsi gaon	04	0.071	551	123
6	Satipara, horizon colony	01 and 04	0.088	2278	470
7	Lohar patti	04	0.047	2951	570
8	Mirzabag	04	0.068	702	142
9	Tinkunia	04	0.059	922	170
10	Dibrujan	04	0.216	2578	540
	Total		1.168	21235	4242
Non-notified Slum					
11	South amollapatty (near kabristan)	04	0.039	358	81
12	Guardpara (North Amolapatty)	04	0.041	735	160
13	Dhubipatty (North Amolapatty)	04	0.028	587	126
14	Amaraguri	02	0.063	1633	341
15	Kalibari	04	0.054	1191	244
16	Koliaghat	02	0.046	1024	207
17	Borbari Dusadpatty	04	0.080	351	68
18	Kauripatty	04	0.054	749	166
19	Chandmari ghat	03	0.132	3199	627
20	Kalishtan	03	0.075	806	189
21	Boiragimath	04	0.034	692	157
22	Itabhata Suwani gaon	03	0.042	1315	306
23	Chiring chapori, horizon colony	04	0.058	900	196
24	Shasanpara	04	0.069	1319	416
	Total		0.815	14931	3284
	Grand Total		1.983	36166	7526

(Local body - 01, State Government - 02, Central Government - 03, Private - 04, others - 05)

Table 102 Slum Census Houses

Sl. No.	Area Name	Dibrugarh (MB + OG)
1	Total number of Slum census houses	7526
2	Total number of occupied Slum census houses	6874
3	Total number of vacant Slum census houses	612
4	Total number of occupied locked Slum census houses	40

(Source: Compiled by Consultant)

6.7 HOUSING DEMAND GAP ANALYSIS

6.7.1 FACTORS CAUSING HOUSING SHORTAGE

There are several factors which would affect the housing shortage. The recent technique in finding the housing shortage is published by Ministry of urban poverty and alleviation. There are 5 major factors which decides the housing shortage in the system. They are -

1. Congestion factors
2. Obsolescence factors
3. Non-Durability
4. Present housing shortage
5. Calculation of housing shortage for 2045 for the projected population.

6.7.1.1 Congestion Factor

Congestion factor is the ratio of households that are residing in unacceptable congested conditions, from physical and socio-cultural viewpoints (i.e. married couples sharing the room with other adults etc.,) or the percentage of households in which each married couple does not have separate room to live. The table 103 indicates that the congestion factor for each Municipalities/Commune Panchayats according to the census 2011. It is observed that the planning area shows a uniform congestion factor for all the Municipalities/communes in Dibrugarh region for the year 2011.

Table 103 Household without exclusive room

Sl. No.	Dibrugarh Planning Area	HH 2011	No exclusive room for marriage couples 2011	Congestion Factor
1	DMB+OG	31,897	436	0.01
2	2 CTs	1,922	20	0.01
3	Rural	43,017	199	0.004
Total for DMPA		76,836	655	0.008

(Source: Compiled by Consultant)

6.7.1.2 Obsolescence Factor

Obsolescence factors is all the bad houses, excluding those that are less than 40 years old and all houses ages 80 years or more. Obsolescence are the households living in obsolete buildings (40 to 80 years old in a bad structural condition, and 80 or more years) and excluding temporary houses (to avoid double counting). The table 104 illustrates the Obsolescence Factor for Dibrugarh Planning Area according to Census 2011.

Table 104 Housing shortage due to obsolescence

Sl. No.	Dibrugarh Planning Area	HH 2011	HH above 50+ yrs in DMPA	Congestion Factor
1	DMB+OG	31,897	955	0.03
2	2 CTs	1,922	99	0.05
3	Rural	43,017	2150	0.05
Total for DMPA		76,836	3204	0.04

The table reveals that the highest obsolescence factor is observed in CT and rural area which indicates that the status of housing condition is poor with respect to the overall housing condition of the Dibrugarh Planning Area. It is also observed that the lowest Obsolescence factor is in DMB area which also witnesses the good quality of socio-economic status in the region mainly due to the urban nature of the area and developments which are in tune with the overall development of the Dibrugarh region.

6.7.1.3 Non-Durability

Non-durability is the no. of temporary houses which are not suitable for living or Non-serviceable units are taken out. Temporary/ kutcha houses are those in which both the walls and roof are made of materials that need to be replaced frequently. As per the census definition, temporary houses are made with walls and roofs made of temporary material. Walls can be made of grass, thatch, bamboo, plastic, polythene, mud, unburnt bricks or wood. Roofs can be made of grass, thatch, bamboo, wood, mud, plastic or polythene. Hence the non-durability of housing is the difference between the number of housing stock to the number of permanent houses. The table 105 represents the details of permanent, semi-permanent house and temporary house within the DMPA.

Table 105 Housing shortage due to non-durability

	Particular	Permanent	Semi-permanent	Temporary	Number of Housing Stock
Urban	Dibrugarh MB	19,353	10012	1160	29365
	Census Towns (CT)	1350	590	178	1940
	Outgrowth (OG)	958	493	27	1149
Rural	Rural areas	12,622	25546	4849	38168
	Total	34,749	36,051	6,036	70,800

6.7.2 ESTIMATION OF HOUSING SHORTAGE

Acute housing shortage in country specially in urban centres has become a burning problem of the day since house construction activities do not keep pace with the growth of population of urban centres. The number of houses has, therefore, been successively falling short of actual requirement of the urban population.

Based on the Ministry of Housing and Urban Poverty Alleviation, National housing shortage, the final estimation of housing shortage is calculated based on the corresponding factors such as homeless population, Non-durability factor, Congestion factor, Obsolescence. It has been calculated based on the census 2011. For this exercise, the following assumptions were adopted with the reference to the Assam state, District and DMB Housing Profile based on Census 2011 housing data:

- Dilapidated houses accounts for 11% of total housing stock for the project area and 4% for the urban areas.
- Vacant houses accounts for 4% of total housing stock for the project area and 10% for the urban areas.

The details of housing shortage based on census 2011 data are presented in the table 106 below.

Table 106 Total Housing Shortage in DMPA

Sl. No.	Housing Shortage	No. of Shortage household
1	Shortage due to Homeless Population	6036
2	Shortage due to Dilapidated Houses	7788
3	Shortage due to Vacant houses	2832
4	Shortage for Slum households	7526
5	Shortage due to congestion in 2011	655
6	Shortage due to obsolescence in 2011	3204
Total Housing Shortage (2011)		28,041

6.8 HOUSING DEMAND GAP ANALYSIS

The future housing requirement for DMPA has been assessed considering both, the quantitative housing shortage, and the qualitative housing shortage. Below mentioned is the quantitative calculation of future housing requirement for year 2045.

Table 107 Decadal additional housing requirement

Year	Additional Population	HH size	Additional HHs
2021	56175	4.5	12483
2031	53147	4	13287
2041	56705	4	14176
2045	24333	4	6083
Total Additional Housing Requirement till 2045			46029

(Source: Compiled by Consultant)

For the 2021 housing projection considered average household size is 4.5; while for 2031,2041 and 2045 projection 4 household size is considered, based on the assumptions of having more numbers of nuclear families in the future than today and constant household formation rate for the entire Planning Area. The projected additional housing requirement considering increase in population by 2045 is 46,029.

Table 108 Total Housing Demand by 2045

Sl. No.	Particulars	Numbers
1	Region	DMPA
2	Total Population 2011	361397
3	Total Household	76836
4	No. of Housing Stock 2011	70800
5	Housing Gap (Factor 1)	5768
6	No. of Good and Livable Houses	69048
7	No. of Dilapidated houses (Factor 2)	7788
8	Congestion Factor 2011	0.008
9	Shortage Due to Congestion Factor (Factor 3)	655
10	Obsolescence Factor 2011	0.04
11	Shortage due to Obsolescence Factor (Factor 4)	3204
12	No. of Locked and Vacant houses (Factor 5)	2832
13	No. of Slum houses (Factor 6)	7526
14	Projected Population 2045	551757
15	Projected Increase in Population from 2011 to 2045	190360
16	Housing requirement for increase in Population (Factor 7)	46029
Total Housing Demand – 2045 (Factor 1+2+3+4+5+6+7)		73,802

(Source: Compiled by Consultant)

6.9 HOUSING PROVISION

The housing provision is met can be accommodate in the proposed Residential, Mixed Use and Conservation zones. Further, the residential and mixed uses zones are divided into different categories; with each has various FSI to offer so the development intensity can be managed. It is proposed to facilitate the provision of a fully serviced dwelling unit for each family and reduce the gap between housing shortage and supply through suitable measures. The planned catering for the additional housing is as mentioned in table 109.

Table 109 Decadal housing provision in DMPA

Year	Additional Population	HH size	Additional HH	Catering for the Shortage	Total Housing Need (decade wise)
2021	56175	4.5	12483	9720 (35%)	22203
2031	53147	4	13287	8332 (30%)	21619
2041	56705	4	14176	5555(20%)	19731
2045	24333	4	6083	4166 (15%)	10249
Total			46,029	27,773	73,802

(Source: Compiled by Consultant)

For the decade 2021, 35% catering for housing shortage is been considered by taking benefit of the different housing schemes and state-central government fund utilization. Similarly, 30%,20% and 15% catering for year 2031,2041 and 2045 respectively.

6.9.1 HOUSING PROVISION BASED ON INCOME GROUP

Table 110 Housing provision considering Income Group

Year	Total Housing Need (decade wise)	EWS 20%	LIG 30%	MIG 40%	HIG 10%
2021	22203	4440	6660	8881	2222
2031	21619	4324	6486	8648	2162
2041	19731	3946	5919	7892	1973
2045	10249	2050	3075	4099	1025
Total	73,802	14760	22140	29520	7382

(Source: Compiled by Consultant)

As per the Ministry of Urban Poverty and Alleviation the population is categorised based on the income level such as Economically Weaker Section (EWS), Low Income Group (LIG), Medium Income Group (MIG) and High-Income Group (HIG).

The table 110 indicates that the housing shortage for 2045 is calculated for each classification based on income level. This table helps to earmark the affordable housing in the Dibrugarh Planning Area and would also help to formulate the housing policy.

6.10 HOUSING POLICY

The main objective of the housing policy for Dibrugarh Planning Area is not only to meet the housing demand by horizon 2045 but also to improve the residential conditions at large. In view of this, Master Plan proposes development of residential neighborhoods having adequate facilities within walk able distance. Design considerations require better planning.

Private sector Participation

Privatization must be encouraged by participation of individuals and developers in the house building activities. The local administration could provide land with offsite and on-site physical and social infrastructure and the private entrepreneurs could invest in house building. In principles, housing has four distinct components for its development i.e., Land Assembly, infrastructure provision, building construction and post occupancy management. The above diagram gives an idea how these activities should be distributed amongst the Government, private and cooperatives making the Government a facilitator for housing development.

Role of Government

Government has to play proactive role of promoting the housing industry by regulatory measures and acting as a watch-dog rather than fully involving its organs in the provision of shelter to the town inhabitants. The magnitude of housing shortage is enormous and the State on its own cannot provide the housing stock. Government will limit its role to development of serviced land and subsequently its release to private developers and Cooperative Societies on premium equivalent to the cost of land plus marginal profit with only advisory and regulatory role in the development of housing industry.

Housing of Different Income Categories

The Master Plan recommends identification of priorities in dealing with different segments of the population. Out of the total demand, income category wise demand has been given in fixing the priority in dealing with different segments of the population: H.I.G. and M.I.G. dwelling units shall be provided with only developed land at market price to cross subsidize the housing for E.W.S./L.I.G.

Group Housing Schemes

To meet the housing demand by 2045, based on the need housing colonies or townships can be developed. Economies of scale are favorable to large colonies because of reduced per capita on investment on infrastructure and services development in large colonies. The Master Plan also envisages smart growth of the city to overcome the scarcity of land and regulate sprawl of urban development in rich agricultural hinterland.

Urban Village

The peripheral village settlements, which have been incorporated in the Planning Area of Dibrugarh, are going to be part of its proposed Urban Area Limits during the process of its expansion. The settlements having a completely different life-style for centuries are now getting merged into urban environment and need a sensitive approach in the planning and development process. At present these settlements do not confirm to any urban character and need an 'Action Plan' for extension of water supply, sewerage and drainage facilities and other basic urban amenities and efficient linkages with the main city. The settlements should get the modern services and amenities and should also be catered for their traditional cultural styles.

6.11 SLUM UPGRADATION PROGRAM

The scheme aims at acquiring sites in various parts of urban areas and to construct tenements and provide developed plots under "Sites and Services" concept to the slum dwellers. Improvement works to the existing Slums are being implemented through the Assam State Housing Board. The tenements in storeyed blocks are made available to the slum dwellers on rental basis. Apart from that, upgradation of slum areas by extending basic amenities viz., roads, water supply, sewerage, education, health, electricity, social infrastructure are also undertaken.

6.11.1 RAJIV AWAS YOJNA (RAY)

Rajiv Awas Yojna a path breaking centrally sponsored scheme for the slum dwellers and urban poor envisages a "Slum Free India" through encouraging states to tackle the problem of slums in holistic manner. The main objectives of RAY are -

1. Bringing existing slums within the formal system and enabling them to avail the same level of basic amenities as the rest of the town.
2. Redressing of failures of the formal system that lie behind the creation of slums.
3. Tackling the shortage of urban land and housing that keep shelter out of reach of the urban poor and force them to resort to extra-legal solutions in a bid to retain their sources of livelihood and employment.

6.11.2 PRADHAN MANTRI AWAS YOJANA (PMAY)

The "Pradhan Mantri Awas Yojana (Urban) - Housing for All" was launched by Government of India with an objective of providing houses to every family by the year 2022. The Mission is being implemented during 2015-2022 and provides central assistance to Urban Local Bodies (ULBs) and other implementing agencies through States/UTs. The "Pradhan Mantri Awas Yojana (Urban) - Housing for All" has following four Sub-schemes giving options for beneficiaries, ULBs / Implementing Agencies and the State Governments:

1. In-situ Slum rehabilitation of Slum Dwellers
2. Credit Linked Subsidy Scheme.
3. Affordable housing in partnership with Public & Private sectors.
4. Beneficiary Led Individual House Construction or enhancement.

6.11.2.1 In-situ Slum Rehabilitation of Slum Dwellers (ISSR)

"In-situ" slum rehabilitation using land as a resource with private participation for providing houses to eligible slum dwellers is an important component of the "Pradhan Mantri Awas Yojana (Urban) - Housing for All" mission. This approach aims to leverage the locked potential of land under slums to provide houses to the eligible slum dwellers bringing them into the formal urban settlement. Slums so redeveloped should compulsorily be denotified.

Eligibility

- Slums, whether on Central Government land/State Government land/ULB land, Private Land, should be taken up for "in-situ" redevelopment for providing houses to all eligible slum dwellers.
- Eligibility of the slum dwellers like cut-off date etc. will be decided by States/UTs preferably through legislation.

Highlights

- Additional Floor Area Ratio (FAR)/Floor Space Index (FSI)/Transferable Development Rights (TDR) for making slum redevelopment projects financially viable.
- Slum rehabilitation grant of Rs. 1 lakh per house, on an average, would be admissible for all houses built for eligible slum dwellers in all such projects.
- Beneficiary contribution in slum redevelopment project, if any, shall be decided and fixed by the States/UTs Government.
- State/UT Governments and cities would, if required, provide additional Floor Area Ratio (FAR)/Floor Space Index (FSI)/Transferable Development Rights (TDR) for making slum redevelopment projects financially viable.
- States/UTs will have the flexibility to deploy this central grant for other slums being redeveloped for providing houses to eligible slum dwellers with private participation, except slums on private land. It means that States/UTs can utilise more than Rs. 1 lakh per house in some projects and less in other projects but within overall average of Rs. 1 lakh per house calculated across the States/UTs.
- The per house upper ceiling of central assistance, if any, for such slum redevelopment projects would be decided by the Ministry.
- States/UTs may decide whether the houses constructed will be allotted on ownership rights or on renewable, mortgageable and inheritable leasehold rights.
- States/UTs may impose suitable restrictions on transfer of houses constructed under this component.
- "In-situ" redevelopment of slums on private owned lands for providing houses to eligible slum dwellers can be incentivised by State Governments/UTs or ULBs by giving additional FSI/FAR or TDR to land owner as per its policy. Central assistance cannot be used in such cases.
- A viable project would have two components i.e. "slum rehabilitation component" which provides housing along with basic civic infrastructure to eligible slum dwellers and a "free sale component" which will be available to developers for selling in the market so as to cross subsidize the project.

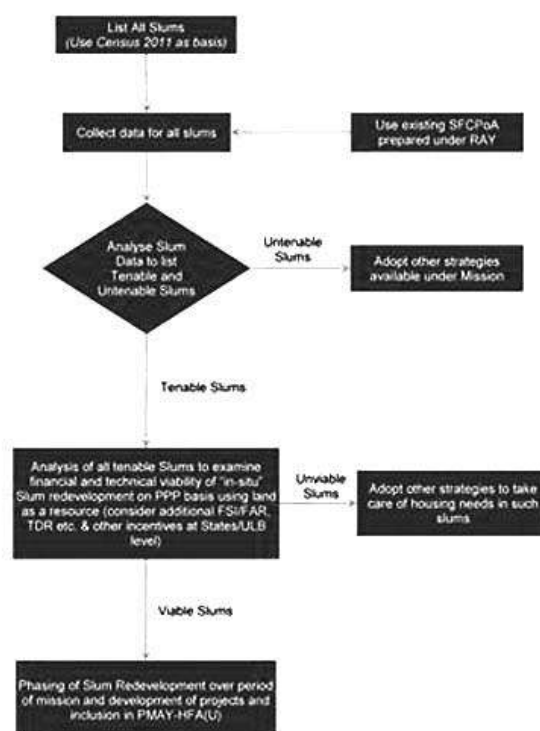
Implementation/Approach for Slum Rehabilitation with Private Partnership is outlined as below:

- All tenable slums as identified in Housing for All Plan of Action (HFAPoA) of the city should be analysed with respect to their location, number of eligible slum dwellers in that slum, area of the slum land, market potential of the land (land value as per ready reckoner can be used), FAR/FSI available and density norms applicable to that piece of land etc..
- On the basis of analysis of slums, the implementing authorities should decide whether a particular slum can be redeveloped with private participation or not using land as a resource and to provide houses to eligible slums dwellers.
- For making projects financially viable, in some cases, States/UTs and cities might have to provide additional FAR/FSI or TDR and relax density and other planning norms. States/UTs may also allow commercial usage for part of the land/FAR as mixed usage of the land.
- States/UTs can also consider clubbing of nearby slums in clusters for in-situ redevelopment to make them financially and technically viable. Such cluster of slums can be considered as a single project.
- While formulating the project, the project planning and implementing authorities should also decide the area of slum land which should be given to the private developers. In some cases, the area of slum may

be more than what is required for rehabilitating all eligible slum dwellers plus free sale component for cross subsidizing the project. In such cases, project planning authorities should give only the required slum land to private developers and remaining slum land should be utilised for rehabilitating slums dwellers living in other slums or for housing for other urban poor.

- Slum dwellers through their association or other suitable means should be consulted while formulating redevelopment projects especially for the purpose of designing of slum rehabilitation component.
- The private developers who will execute the slum redevelopment project should be selected through an open transparent bidding process. The eligibility criteria for prospective developers can be decided by States/UTs and ULBs. The scope of work of the prospective developers should be to conceive and to execute the project as mandated by the implementing agency using its

Strategy for Slum Redevelopment using Land as a Resource
(Ref. Para 4 of the guidelines)



financial and technical resources. The project developers would also be responsible for providing transit accommodation to the eligible slum dwellers during the construction period.

- All financial and non financial incentives and concessions, if any, should be integrated in the project and declared 'a priori' in the bid document. These incentives and concessions should also include contribution from beneficiaries/slum dwellers, if any.
- Sale of "free sale component" of project should be linked to the completion and transfer of slum rehabilitation component to the implementing agency/state. Such stipulation should be clearly provided in the bid document to avoid any complication.
- Slum rehabilitation component should be handed over to implementing agency to make allotments to eligible slum dwellers through a transparent process. While making the allotment, families with physically handicapped persons and senior citizens should be given priority for allotment on ground floor or lower floors.
- Open bidding for the slum redevelopment project may result either into a positive premium or negative premium. In case of positive premium, the developer who offers the highest positive premium while satisfying all other conditions should be selected. In case of negative premium, the implementing authority may select the bidder proposing lowest negative premium. Funds required to make the project viable can be made available either from slum rehabilitation grant of Central Government or own fund of States and ULBs as well as positive premium received from other projects.
- Any private participation, that demands substantial grants from Government, may not be encouraged. Slums can either be taken up later for development or Kutcha/ unserviceable houses in such slums can be taken up under other components of the mission.
- States/UTs project planning and implementing authorities, ULBs should have a single project account for

slum redevelopment project where positive premium, slum rehabilitation grant from Central Government, funds from State/UT Government or any other source is to be credited and used for financing all slum redevelopment projects with negative premium. Such accounts can be opened city-wise.

- Slum rehabilitation projects would require various approvals from different agencies as per prevailing rules and procedures in the States/UTs. Project development may also require changes in various development control rules. To facilitate such changes and for faster formulation and approval of projects, it is suggested that a single authority should be constituted with the responsibility to change planning and other norms and also for according approval to projects.

6.11.2.2 Credit Linked Subsidy Scheme for EWS/LIG (CLSS)

Pradhan Mantri Awas Yojana (Urban) - Housing For All Mission, in order to expand institutional credit flow to the housing needs of urban poor is implementing credit linked subsidy component as a demand side intervention.

- Beneficiaries of Economically Weaker Section (EWS) and Low Income Group (LIG) seeking housing loans from Banks, Housing Finance Companies and other such institutions would be eligible for an interest subsidy at the rate of 6.5 % for a tenure of 20* years or during tenure of loan whichever is lower.
- The credit linked subsidy will be available only for loan amounts upto Rs 6 lakhs and additional loans beyond Rs. 6 lakhs, if any, will be at nonsubsidized rate.
- Interest subsidy will be credited upfront to the loan account of beneficiaries through Primary Lending Institutions (PLI), resulting in reduced effective housing loan and Equated Monthly Installment (EMI).
- The Net Present Value (NPV) of the interest subsidy will be calculated at a discount rate of 9 %.

Home Ownership

The houses constructed/acquired with central assistance under the Mission should be in the name of the female head of the household or in the joint name of the male head of the household and his wife, and only in case when there is no adult female member in the family, the house can be in the name of male member of the household.

Coverage

All Statutory Towns as per Census 2011 and towns notified subsequently, including planning area as notified with respect to Statutory Town.

Purpose

New construction, acquisition and addition of rooms, kitchen, toilet etc. to existing dwelling houses as incremental housing.

Beneficiaries

- Beneficiary family will comprise husband, wife and unmarried children.
- The beneficiary family should not own a pucca house either in his/her name or in the name of any member of his/her family in any part of India.
- EWS Households having annual income up to Rs. 3,00,000/-
- LIG Households having annual income between Rs. 3,00,001/- and upto Rs. 6,00,000/-
- Preference under the scheme, subject to beneficiaries being from EWS/LIG segments, should be given to Manual Scavengers, Women (with overriding preference to widows), persons belonging to Scheduled Castes/ Scheduled Tribes/ Other Backward Classes, Minorities, Persons with disabilities and Transgender.

Area which can be constructed

- Carpet area of house being constructed or enhanced under this component of the Mission should be upto 30 square meters for EWS category and upto 60 square meters for LIG category.
- Beneficiary, at his/her discretion, can build a house of larger area but interest subsidy would be limited to first Rs.6 lakh only.
- For incremental housing/extension, the area limit will be 30 sq.mt. and 60 sq.mt. of carpet area for EWS and LIG category respectively.

Subsidy and Loan details

- Maximum loan amount: as per eligibility of customer decided by bank / Financial Institution based on due diligence.
- Maximum loan tenure : based on the guidelines of the PLI.
- Maximum tenure for subsidy computation: 20+ years or the tenure of the loan, whichever is lower.
- Maximum loan amount for subsidy calculation: Rs. 6 lakh.
- Interest rate for subsidy : 6.5%

Housing and Urban Development Corporation (HUDCO) and National Housing Bank (NHB) have been identified as Central Nodal Agencies (CNAs) to channelize this subsidy to the Primary Lending Institutions and for monitoring the progress of this component. This scheme will be implemented through Banks/Financial Institutions.

6.11.2.3 Affordable Housing in Partnership (AHP)

The third component of the Mission is Affordable Housing in Partnership which is a supply side intervention. The Mission will provide financial assistance to EWS houses being built with different partnerships by States/UTs/Cities.

Affordable housing projects are the projects where atleast 35% of houses are constructed for EWS category.

- To increase availability of houses for EWS category at an affordable rate, States/UTs, either through its agencies or in partnership with private sector including industries, can plan affordable housing projects.
- Central Assistance at the rate of Rs.1.5 Lakh per EWS house would be available for all EWS houses in such projects.
 - The States/UTs would decide on an upper ceiling on the sale price of EWS houses in rupees per square meter of carpet area in such projects with an objective to make them affordable and accessible to the intended beneficiaries. For that purpose, States/UTs and cities may extend other concessions such as their State subsidy, land at affordable cost, stamp duty exemption etc.
- The sale prices may be fixed either on the project basis or city basis using following principles:
 - An Affordable Housing Project (AHP) can be a mix of houses for different categories but it will be eligible for central assistance, only if at least 35% of the houses in the project are for EWS category and a single project has at least 250 EWS houses. CSMC at GOI level, however, can reduce the requirement of minimum number of houses in one project on the request of State Government.
 - Allotment of houses to identified eligible beneficiaries in AHP projects should be made following a transparent procedure as approved by SLSMC and the beneficiaries selected should be part of HFAPoA.
- Preference in allotment may be given to Physically Handicapped Persons, Senior Citizens, Scheduled

Castes, Scheduled Tribes, Other Backward Classes, Minority, Single Women, Transgender and Other Weaker and Vulnerable Sections of the Society.

- While making the allotment, the families with person with disability and senior citizens may be allotted house preferably on the ground floor or lower floors.
- Detailed Project Report (DPR) of such projects prepared by concerned implementing agencies should be approved by SLSMC.

Coverage

- All statutory towns as per Census 2011 and towns notified subsequently would be eligible for coverage under the Mission.
- The Mission will support construction of houses upto 30 square meter carpet area with basic civic infrastructure.
- States/UTs will have flexibility in terms of determining the size of house and other facilities at the State/ UT level in consultation with the Ministry but without any enhanced financial assistance from Centre.
- Affordable Housing Projects in partnership should have basic civic infrastructure like water, sanitation, sewerage, road, electricity etc.
- The minimum size of houses constructed under the Mission under each component must conform to the standards provided in National Building Code (NBC).
- The houses under the Mission should be designed and constructed to meet the requirements of structural safety against earthquake, flood, cyclone, landslides etc. conforming to the National Building Code (NBC) and other relevant Bureau of Indian Standards (BIS) codes.
- All houses built or expanded under the Mission should essentially have toilet facility.
- The houses constructed/acquired with central assistance under the Mission should preferably be in the name of the female head of the household or in the joint name of the male head of the household and his wife.
- Only in cases when there is no adult female member in the family, the house can be in the name of male member of the household.

Implementation

A beneficiary will be eligible for availing only a single benefit under any of the existing options i.e. Slum Redevelopment with Private Partner, Credit Linked Subsidy, Direct Subsidy to Individual Beneficiary and Affordable Housing in Partnership. It will be the responsibility of States/UTs Government to ensure that the beneficiary is not given benefit under more than one component of the Mission.

6.11.2.4 Beneficiary Led Construction (BLC)

Beneficiaries could avail the benefits of scheme component for New construction and Enhancement of existing house. Highlights of 'Beneficiary Led (Individual House) Construction' or Enhancement (BLC) Progress to be tracked through geo tagged photographs of the house.

Eligibility for New Construction

- Urban residents of EWS : Economically Weaker Section (annual income upto Rs 3 lakhs) & LIG: Low Income Group (annual income Rs 3 to 6 lakhs).
- Beneficiary families should not own a pucca house anywhere in India.

For BLC Enhancement

- Beneficiaries may be residing either in slums or outside the slums.
- Beneficiaries in slums which are not being redeveloped can be covered under this component if beneficiaries have a Kutcha or Semi-Pucca house.

Benefit

- To individual eligible families belonging to EWS categories, to either construct a new house or enhance existing house on their own to cover the beneficiaries, who are not able to take advantage of other components of the mission.
- Such families may avail of central assistance of Rs. 1.50 lakhs for construction of new house or for enhancement of existing house under the mission.

Why Enhancement

- As per the Technical Group on Urban Housing Shortage (2012-17), 80% of households are living in congested houses.
- Congestion factor is defined as the percentage of households in which each married couple does not have a separate room to live.

Provisions related to enhancement in PMAY(U) Guidelines

As per clause 7.2 (b) of PMAY(U) guidelines:

"If the beneficiary has a pucca house with carpet area of up to 21 sq. mt. or a semi-pucca house, lacking in one of the facilities (i.e. room, kitchen, toilet, bathroom or a combination of any of these), it may be taken up for enhancement subject to ULB/State ensuring structural safety of the house and adherence to following conditions:

- The total carpet area after enhancement must not be less than 21 sq mt and must not be more than 30 sq mt.
- Enhancement shall mean addition of minimum carpet area of 9.0 Sq Mt into the existing house with pucca construction of at least one habitable room or room with kitchen and/or bathroom and/or toilet conforming to NBC norms.
- The details of the enhancement proposals under BLC vertical shall be submitted in proposed Annexure 7D of the PMAY (U) guidelines."



6.12 STRATEGIES FOR HOUSING & INCLUSIVE DEVELOPMENT

The housing strategies adopted for the Master Plan – 2045 is based on the principles of densifying areas where there is ample infrastructure available and land is available for residential development. Through the development control regulations, the authority intends to promote mid rise development to optimize the utilization of land and infrastructure and increase the housing stock in the planning area at minimum infrastructure cost to the government. The authority has adopted the mixed use land use to promote residential use adjacent to the employment centers and in areas where the employment centers are absent or in areas far from the residential areas, the authority has tried to bring in employment generating landuses in an attempt to strengthen these areas and promote better housing options nearby for the local population.

Providing residence adjacent to the employment center safeguards the interest of Economically weaker sections who prefers to stay closer to work and avoid transportation cost. It is also advised through the Master Plan-2045 to promote affordable housing by earmarking land for residential projects for economically weaker sections of the planning area. Through Master Plan - 2045 the authority has identified

the new conurbation for 2045 which forms a continuous development with residential as a major land use to address the major housing requirements of the planning area. This also enables the merger of unplanned development taken place during the last few decades into main urban development of the planning area with proper circulation network and basic infrastructure.



7 TRANSPORTATION

Transportation plays a vital role towards the mobility of people as well as goods & services of a particular system. People are always mobile, and mobility is most important dynamic functions of a city which is having more bearing towards the economic development. In addition, transportation and landuse are to be integrated so as to achieve reduction in trip length, increase in public transport usage etc.

Strategically located Dibrugarh is having all modes of Transportation like Airport, Water Way, Roads and Rail. Dibrugarh was the first town where Railway was introduced in entire Assam in year 1880 from Dibrugarh to Margherita. There are four railway stations fall under DMPA. Out of them, Dibrugarh Town railway station is the oldest one.

The Dibrugarh region has an airport facility, which is recording good numbers of footfall annually due to its key location, tourism and as gateway to Arunachal Pradesh. Dibrugarh Airport is located at Mohanbari in Dibrugarh with an area around 2.5 sqkm. The airport is under expansion to accommodate larger aircraft. The runway of the airport is being extended from 6000 feet to 7500 feet.





7.1 TRANSPORTATION NETWORK

7.1.1 REGIONAL CONNECTIVITY OF DIBRUGARH

The highways which pass through the planning area connect Dibrugarh to the nearby cities. By 4 mode of transportation- road, rail, airway, and waterway connected Dibrugarh to other districts and states.

7.1.1.1 Interstate Connectivity (From Dibrugarh)

Dibrugarh is connected to other states of India by road, rail, or airway. Table 111 manifest the time taking (in hrs.) and distance (in km) from Dibrugarh to other states by different modes of transportation.

Table 111 Interstate modes of transportation from Dibrugarh

Connectivity from Dibrugarh	Distance (km)	Duration (in hrs)		
		By Road	By Rail	By Flight
Itanagar	199	6 hrs	3.5 hrs	-
Kohima	336	10 hrs	8.5 hrs	5.5 hrs
Imphal	469	14 hrs	14 hrs	4.5 hrs
Aizwal	721	24 hrs	20 hrs	5.5 hrs
Shillong	502	12 hrs	14 hrs	4.5 hrs
Guwahati	442	10 hrs	9.5 hrs	2 hrs
Siliguri	876	20 hrs	16 hrs	1.5 hrs
Gangtok	942	24 hrs	-	-

(Source: Compiled by Consultants)

From Dibrugarh to Itanagar is covering minimum distance i.e. 199 km than other places also taking less time by road and railway but Gangtok is far away from Dibrugarh that taken 24 hrs. by roadway and other modes of transportation is not available in this case. Figure 91 represented graphical location from Dibrugarh to other state regions.

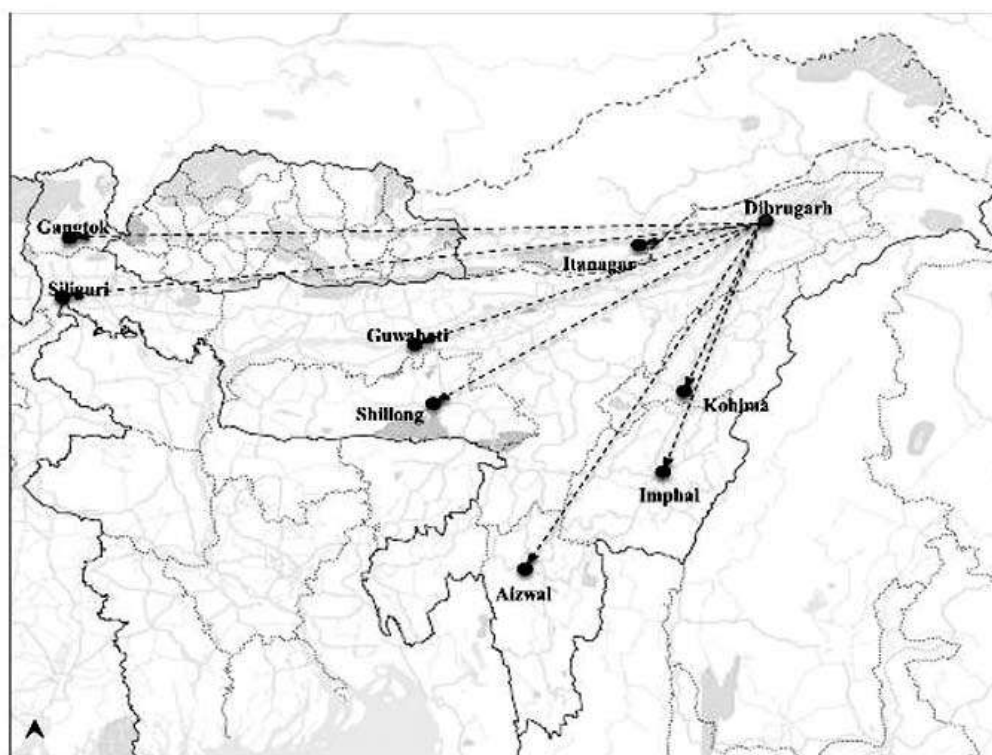


Figure 91 Interstate Connectivity from Dibrugarh district

7.1.1.2 Intercity Connectivity (From Dibrugarh)

Dibrugarh has the intercity connectivity by road as well as by rail. The table no. 112 below shows the various modes of transportation with the nearest cities which are Silapathar, Tinsukia, Sivasagar and Jeypore. The minimum distance is 49 kilometers from Tinsukia to Dibrugarh and maximum is 80 kilometers from Sivasagar.

Table 112 Intercity modes of transportation from Dibrugarh

Connectivity from Dibrugarh	Distance (km)	Duration (in hrs)	
		By Road	By Rail
Silapathar	50	1 hrs	-
Tinsukia	49	1.5 hrs	1.1 hrs
Sivasagar	80	2.5 hrs	1 hrs
Jeypore	65	3 hrs	2.5 hrs

(Source: Compiled by Consultants)

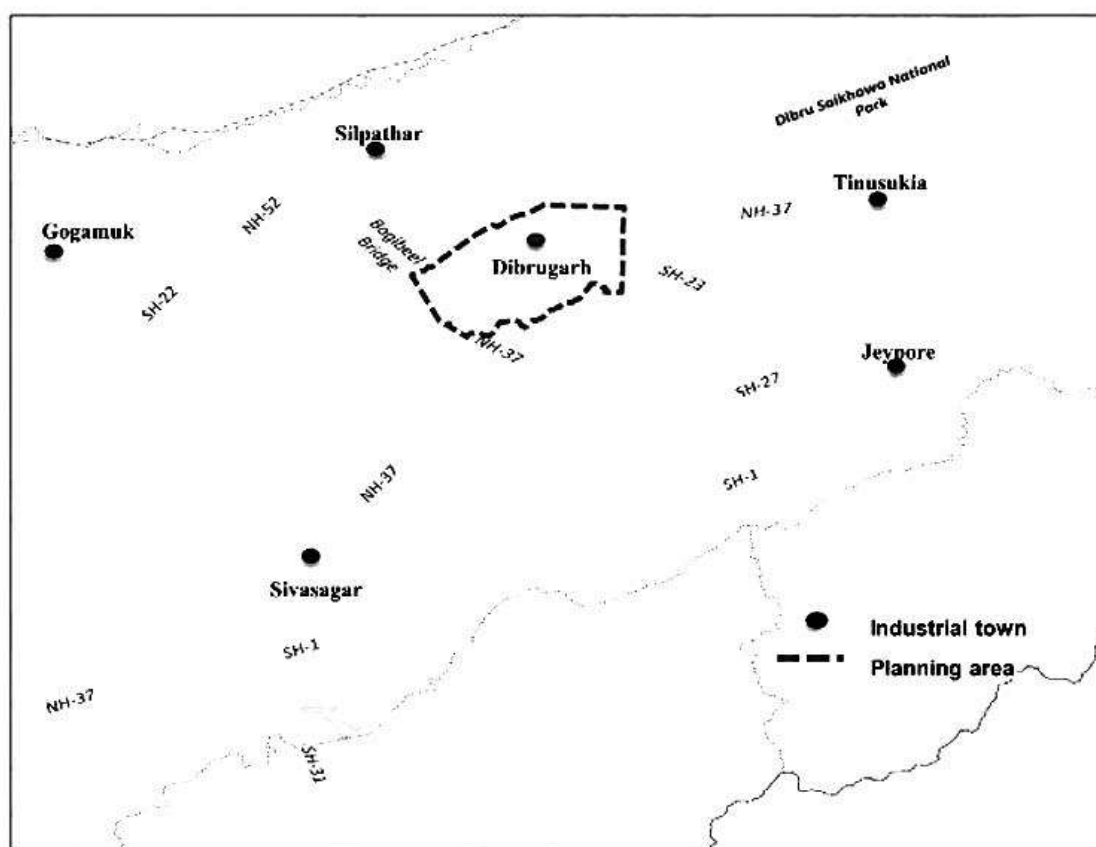


Figure 92 Intercity connectivity from Dibrugarh district

7.1.1.3 Waterway Connectivity (From Dibrugarh)

Apart from road and rail, Dibrugarh is connected via waterways also and that is National waterways – 2 which has length of 891 kilometers. Along with that the terminals have also been mentioned in table no. 113 below. Fig 93 is the graphical representation of National Waterways-2 integrating the important towns on the bank of Brahmaputra.

Table 113 National Waterways terminals

Name	Length (km)	Terminals
National Waterways - 2	891	Dhubri, Jogighopa, Pandu (Fixed terminals), Tejpur, Silghat, Neamati, Dibrugarh, Sengajan, Panbari, Sadiya, Saikhowa

Source: Compiled by Consultants

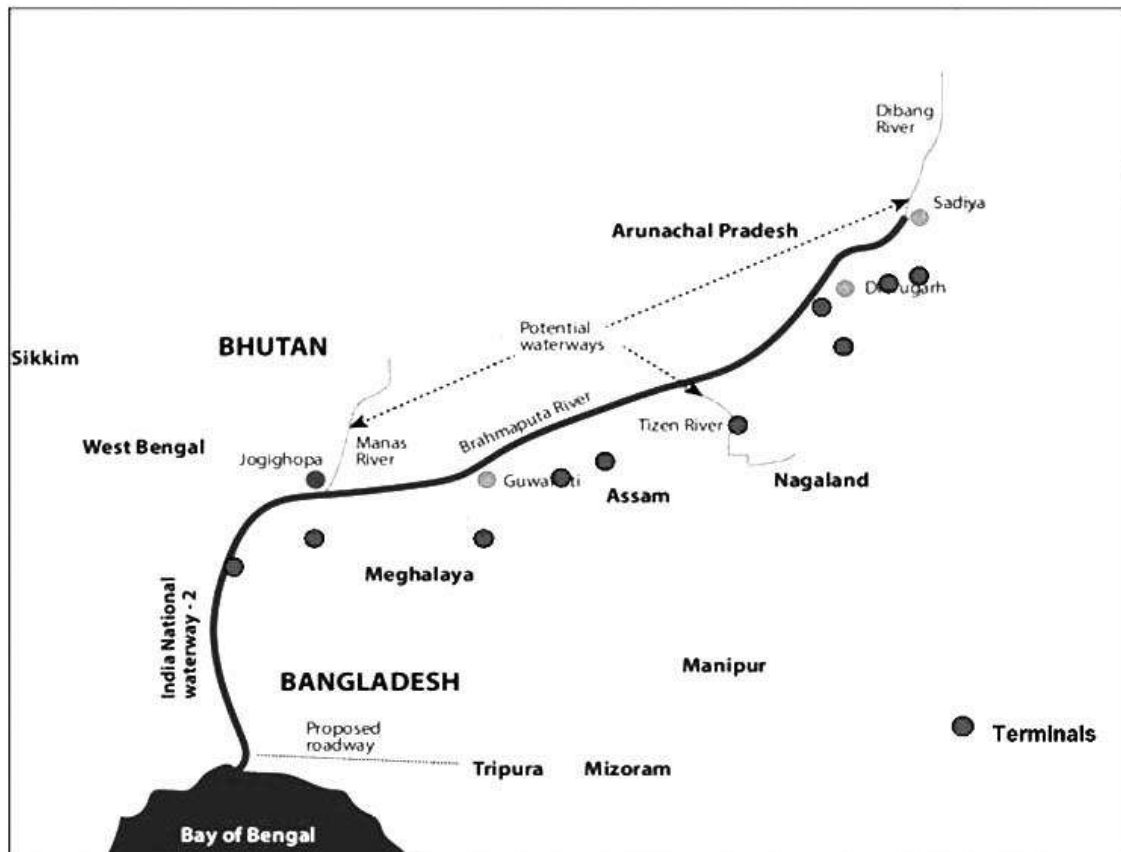


Figure 93 Waterway connectivity from Dibrugarh district

7.1.2 EXISTING ROAD NETWORK

To understand the demand-supply gap and accordingly to assess the improvement requirements of the study area a detail analysis of existing transport facility characteristics is necessary. As existing traffic and travel characteristics introduces the transport system demand, existing transport facility characteristics summarize the system supply. Appreciation of road network characteristics is important to assess existing capacity of the roads, identify the constraints, if any, and assess the potential for improvement/up gradation of the road network to cater the existing and projected traffic demand. For the present study, a detailed inventory of major road network has been carried out. The road network inventory data was analysed in terms of parameters like length of road, carriageway, width of footpath / shoulder, no. of lanes etc.

7.1.2.1 Primary Road Network

The primary roads in the Planning Area are NH-37, NH-52B and NH-15(new). National Highway Number 37 is passing through States Assam and Arunachal Pradesh. In Assam, NH-37 starts from Goalpara and ends at Sadia Bridge (Tinsukia) covering total distance of 684 KM. The part of NH-37, within Dibrugarh Municipal Board area, traditionally famous as Assam Trunk (AT) road. Another is the NH-52B, which is a part of 1,850-km long Trans- Arunachal Highway covering 100km road stretch in Assam. NH-52B enters in DMPA from south Dihing Thakerani Gaon and by passing through Jokai reserve forest it ends at junction with NH-37 near Lapat Kata Kachari gaon. Finally, New NH -15 starting from its junction with NH-27 near Baihata-Charali connecting Tezpur, North Lakhimpur crossing Brahmaputra from north it enters in DMPA at Kawaimari gaon and meets NH-37 at Nahazar Kanwar Gaon.

7.1.2.2 Secondary Road Network

Dibrugarh Urban Area is connected to its adjoining regions mainly via five important Roads. They are:

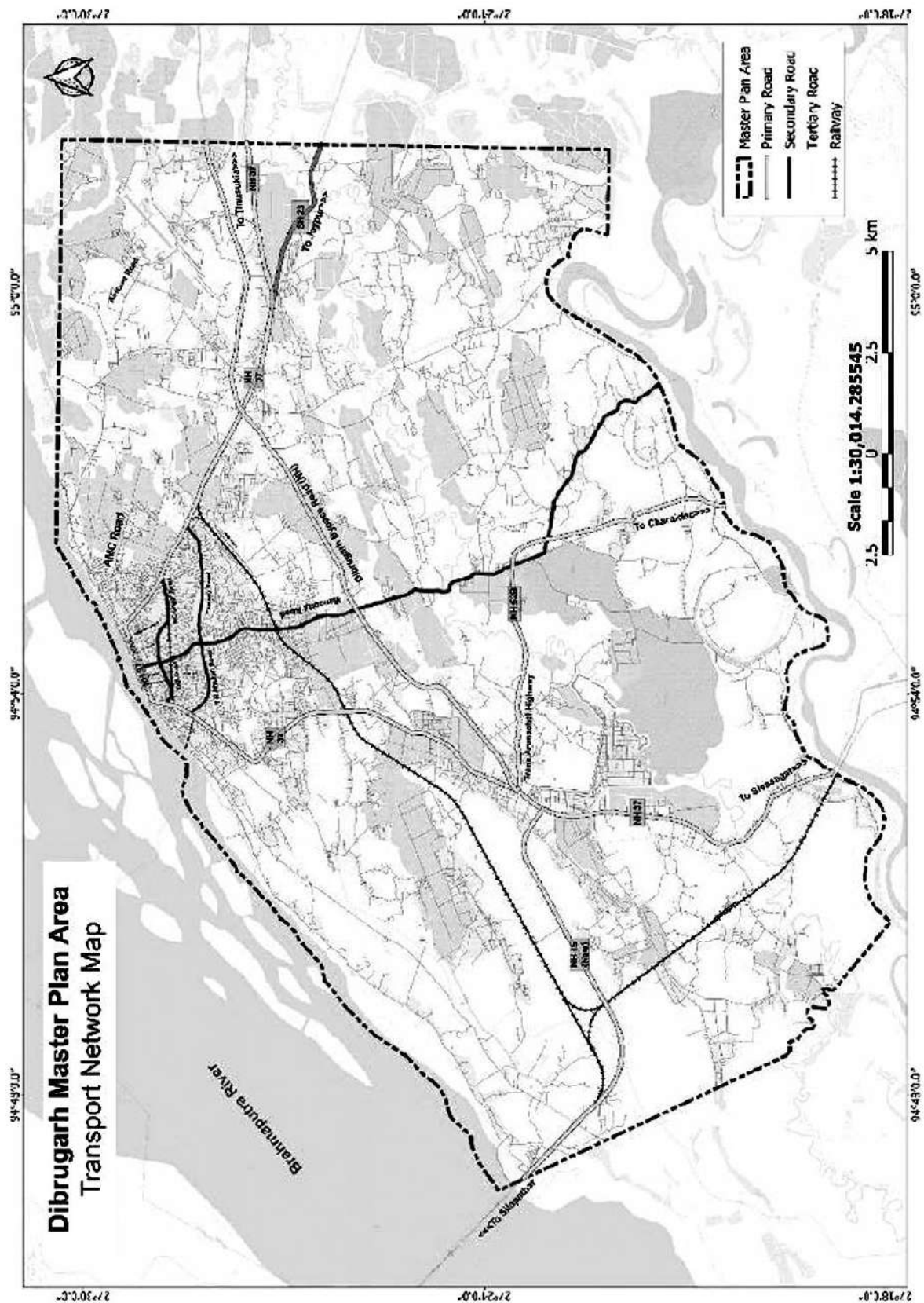
1. Mancotta road (North - South link)
2. RKB Road (NH-37 West to Thana Chariali)
3. K.C.Gogoi road (Thana Chariali to NH-37 East link)
4. T R Phukan Road (Amolapatty East to Chowkidingee West)
5. Convoy Road (Chowkidingee to NH-37 East link)

Interaction of passenger traffic as well as freight is observed to be highest with Tinsukia followed by Sivasagar district. Both the connections with Dibrugarh are used for interaction- moreover, the route via Dibrugarh Bypass is preferred for less distance detour as it creates outer cordon link for traffic coming from Sivasagar district and makes trip towards Tinsukia, Duliajan, Chabua and Dibsai. As the road is having 10m carriage way it can be travelled by all small and heavy vehicles.

7.1.2.3 Tertiary Road Network

The tertiary road network consists of all the city roads and village roads and link roads which connect the rest of the settlements in the Planning Area. These roads connect the settlements along various contours and hilly undulating terrain.





7.1.3 ROAD INVENTORY

Road network of a city gives idea of the hierarchy of roads present in the city. The hierarchy of city is based on different widths of the roads. It also tells that which road perform which type of function like arterial road, sub-arterial road, collector streets or access roads. It is important to identify higher hierarchy roads as they are major transit corridors of any city. Road inventory is depicted in the figure 95 which includes all the highways, major roads, minor roads, private/public roads, village roads etc. The whole network shows the road connectivity in the city.

7.1.3.1 Road Hierarchy

The highways which pass through the Planning Area connect Dibrugarh to nearby cities. Except Highways and few other roads, majority of the roads in the Planning area are having a right of way less than 12m. For example, the roads running across key commercial areas such as New Market are too congested, and this leads to increased travel time within the city and deterioration in quality of life in these important nodes of the planning area.

The roads in the Planning area are shown in the fig 94 in different categories with respect to their RoW. The RoW in the planning area varies from 4 m to 45 m. It can be observed from the fig 94 that some of the important roads such as NH 37 do not have a uniform right of way. In Assam, NH – 37 has a right of way of 15 m but reduces to 13 m as it enters in Dibrugarh MB area near Laluka gaon area. Part of NH – 37(AT Road), which passes through Marwaripatty to Phool Bagan tiniali is generally observed with encroachment by unauthorized parking of HMTVs on both sides of road resulting in reduced accessible width of carriageway only by 8 m. NH – 52B, runs from river Burhi dihing to NH – 37 in DMPA has ROW of 40 m, however, consist carriageway up to 7 m only. Moreover, Dibrugarh bypass highway consist 45 m of ROW whereas carriage way is of 10 m only.

7.1.3.2 Primary Roads

National Highway (NH)

National Highways passing through the Dibrugarh Planning Area along with its length, width and number of lanes are presented in table 115. The New NH -15 starting from its junction with NH-27 near Baihata-Charali connecting Tezpur, North Lakhimpur crossing Brahmaputra from north it enters in DMPA at Kawaimari gaon and meets NH-37 at Nahazar Kanwar Gaon. NH-37 starting from South-West DMPA boundary near Kutaha gaon connecting Amolapatty, Marwaripatty, Phool Bagan from North it further connects Graham bazar towards South-East and heads towards Tinsukia in East. Dibrugarh bypass is a highway forming West-East link with NH-37 to through the traffic coming from North Lakhimpur and Sivasagar toward Tinsukia and Chabua. Another is the NH-52B, which is a part of 1,850-km long Trans- Arunachal Highway covering 100 km road stretch in Assam. For better understanding the width variation of NH-37, its length within DMPA has been divided in to five parts and mentioned in table 114. The figure 95 depicts the major roads passing through the planning area.



Table 114 List of National Highways passing through Dibrugarh planning area

Sl. No.	Name of the road (NH)	Type of road	Length of the Road (km)	R.O.W (m)	Shoulder+ footpath width for one side (m)	No. of lanes
1.	Kawaimari Gaon to Patra Gaon	NH 15 (New)	8	15	2.5	2
2.	Kutaha Gaon to Laluka Gaon	NH 37	19	15	2.5	2
	Laluka Gaon to Amolapatty	NH 37	1	13	1.5	2
4.	Amolapatty to Marwari Patty	NH 37	1.5	15	2.5	2
5.	Marwai Patty to Gabhrupathar	NH 37	4	17	3.5	2
6.	Gabhrupathar to Tinsukia (upto DMPA)	NH 37	11.5	13	5	2
7.	Burhi Dihing to NH 37	NH 52 B	12	40	2.5	2
8.	Dibrugarh Bypass	NH	19.5	45	2.5	2

(Source: Compiled by Consultants)

State Highway (SH)

The table 115 describes the State Highway passing through Dibrugarh Planning area with parameters like width of carriage way, its length and number of lanes.

Table 115 List of State Highway passing through Dibrugarh planning area

Sl. No.	Name of the road (SH)	Type of road	Length of the Road (km)	Road width (m)	Shoulder+ footpath width for one side (m)	No. of lanes
1.	Dhulajjan-Dibrugarh (Lahowal to Jeypore) within DMPA	SH 23	4.5	10	1.3	2

7.1.3.3 Secondary Roads

The major roads are the means to serve and connect all the areas in the city and to villages. As per IRC, the roads which are having road width greater than 10 m are counted as Major roads. Following are the roads which fall under this category as per IRC guideline.

Table 116 List of Primary roads of Dibrugarh MP area

Sl. No.	Name of the Roads (Major Roads)	Junction	Length of the Road (km)	Width of the C.W. (mt)
1.	Mancotta Road	Phool Bagan Tiniali to Chowkindigee	1.8	10
		Chowkindigee to Chring Gaon	3.4	10
2.	RKB Path	Boga baba Tiniali to Thana Chariali	1.3	11
3.	KC Gogoi Path	Thana Chariali to Gabharupothar Junction	1.7	10
4.	T R Phukan	Amolapatty Chariali to Chowkindigee	2	12
5.	Convoy Road	Chowkindigee to Podumnagar 2 (NH 37)	3	12
6.	AMC Road	Graham bazar Tiniali to Patlan Bazar Chariali	1.2	10

(Source: Compiled by Consultants)

7.1.3.4 Tertiary Roads

All rest road network including street road, village road and other roads and counted as tertiary roads. Below in table 117 mentioned are the roads fall under this category.

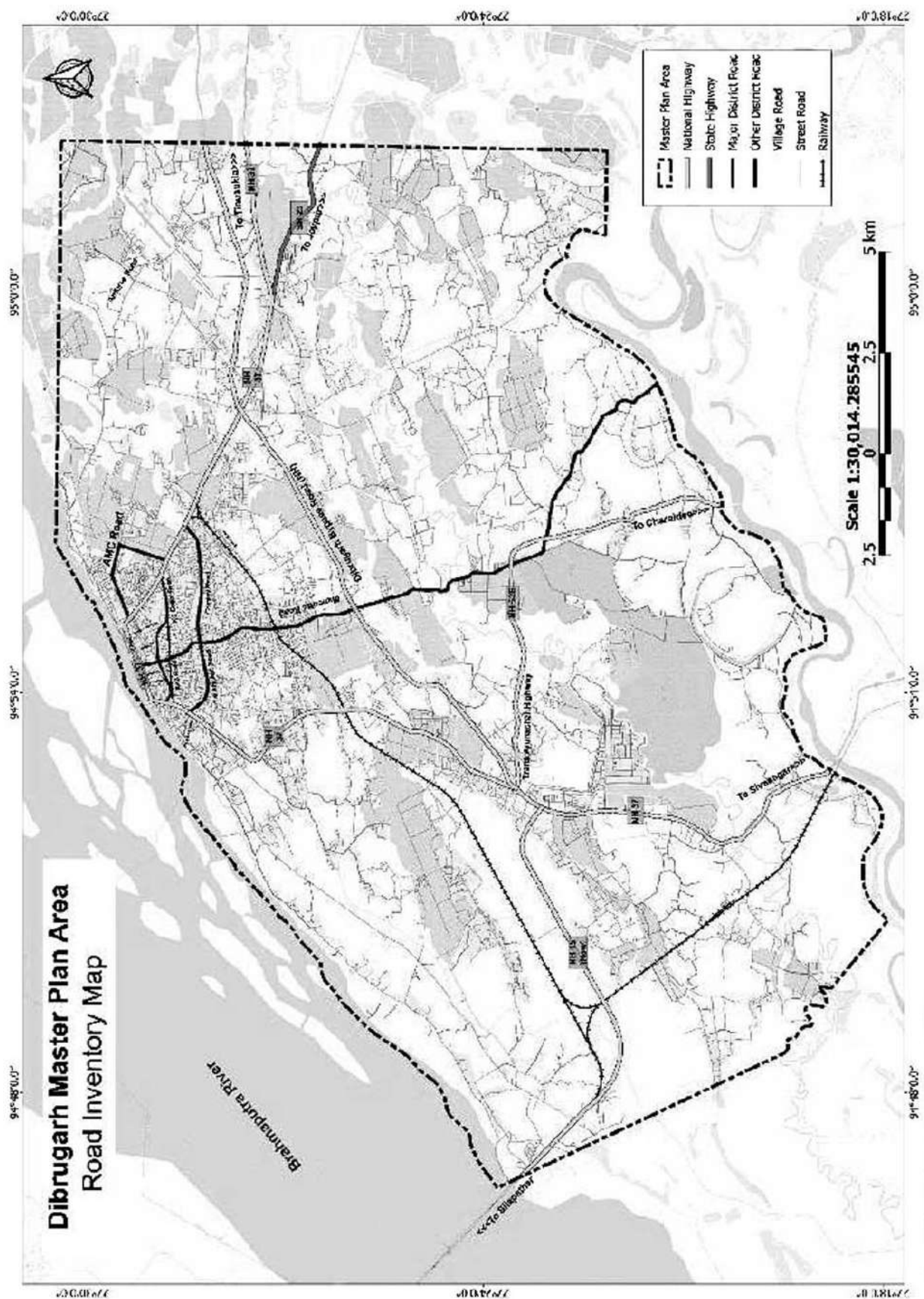
Table 117 List of tertiary roads within DMPA

Sl. No.	Name of the Roads	Junction	Length of the Road (km)	Width of the C.W. (mt)
1.	Mancotta	Chring gaon to Jokai Botanical Garden	6.8	7.5
		Jokai Botanical Garden to Chamoguri Bangali Gaon	6	7
2.	Public Road	Patitan bazar Chariali to Water resource department Dibrugarh	0.7	6.9
		Water resource department to Majjan Masjid	1.7	4.5
3.	Airforce Road	Majjan Masjid to Majjan Borsaikia gaon	6.5	4
		Majjan Borsaikia gaon to Athabari gaon	3.9	6.5

For Mancotta road, the stretch from Chring gaon to Chamoguri Bangali Gaon is categorized as minor as it is having less than 10 m of C.W. width.



SH Road, Dibrugarh



7.2 VEHICLE REGISTRATION

Vehicle registration is done to establish a link between a vehicle and an owner or user of the vehicle. In the table 118 given below, categories of public and private vehicles along with their number is mentioned. The information has been provided by the District Transport Office. The categorization has been done based on transport and non-transport use. Further in table 119, the number of vehicles is depicted of LMV (light motor vehicles) and HMV (heavy motor vehicles).

Table 118 Major Category of Vehicle Register in Dibrugarh District

Transport			Non-Transport	
Category		No. of Vehicles	Category	No. of Vehicles
Public	Ambulance	167	Articulated Vehicle	25
	Bus	59	Construction Equipment Vehicle	59
	Dumper	778	Crane Mounted Vehicle	61
	e-Rickshaw (P)	246	Excavator (NT)	37
	e-Rickshaw with Cart (G)	45	Fire Fighting Vehicle	14
	Goods Carrier	7457	Fire Tenders	6
	Maxi Cab	488	Forklift	10
	Motor Cab	2087	M-Cycle Scooter	128483
	Omni Bus	1	M-Cycle Scooter with Sidecar	9
	Three-Wheeler (Goods)	173	Mobile Clinic	1
	Three-Wheeler (Passenger)	1481	Mobile Workshop	1
	Tractor (Commercial)	1496	Vehicle fitted with compressor	5
	Tractor Trolley (Commercial)	1	Vehicle fitted with generator	11
	Trailer (Commercial)	1271	Vehicle fitted with Rig	20
Private	Camper Van/Trailer	7	Moped	31
	Cash Van	6	Motor Car	47842
	Excavator (Commercial)	204	Recovery Vehicle	1
	Hearses	1	GRAND TOTAL (Transport + Non-Transport)	193162
	Omni Bus (Private Use)	32		
	Private Service Vehicle	1		
	Private Service Vehicle (Individual Use)	2		



Table 119 LMV and HMV categorical data registered

Sl. No.	LMV – Light Motor Vehicle	No. of Vehicles
1.	Agricultural Tractor	11
2.	Ambulance	167
3.	Camper Van/Trailer	7
4.	Cash Van	6
5.	e-Rickshaw (P)	246
6.	e-Rickshaw with Cart (G)	45
7.	Forklift	10
8.	Hearses	1
9.	Maxi Cab	488
10.	M-Cycle/Scooter	128483
11.	M-Cycle/Scooter with Sidecar	9
12.	Mobile Clinic	1
13.	Mobile Workshop	1
14.	Moped	31
15.	Motor Cab	2087
16.	Motor Car	47842
17.	Private Service Vehicle	1
18.	Private Service Vehicle (Individual Use)	2
19.	Three-Wheeler (Goods)	173
20.	Three-Wheeler (Passenger)	1481
HMV – Heavy Motor Vehicle		
21.	Articulated Vehicle	25
22.	Bus	591
23.	Construction Equipment Vehicle	59
24.	Crane Mounted Vehicle	61
25.	Dumper	778
26.	Excavator (Commercial)	204
27.	Excavator (NT)	37
28.	Fire Fighting Vehicle	14
29.	Fire Tenders	6
30.	Goods Carrier	7457
31.	Omni Bus	1
32.	Omni Bus (Private Use)	32
33.	Recovery Vehicle	1
34.	Tractor (Commercial)	1496
35.	Tractor Trolley (Commercial)	1
36.	Trailer (Commercial)	1271
37.	Vehicle Fitted with Compressor	5
38.	Vehicle Fitted with Generator	11
39.	Vehicle Fitted with Rig	20
GRAND TOTAL		193162

(Source: DTO, Dibrugarh District, 2020)

7.3 PUBLIC TRANSPORT

7.3.1 PUBLIC TRANSPORT AND ROUTES

The town has both railway and bus terminus which increases the chances of trade and commerce with other towns and free flow movement of people from one place to another. Public transport points as Airport, Railway Station, Bus Stand and Bus Stops are mentioned in the fig 96 below.

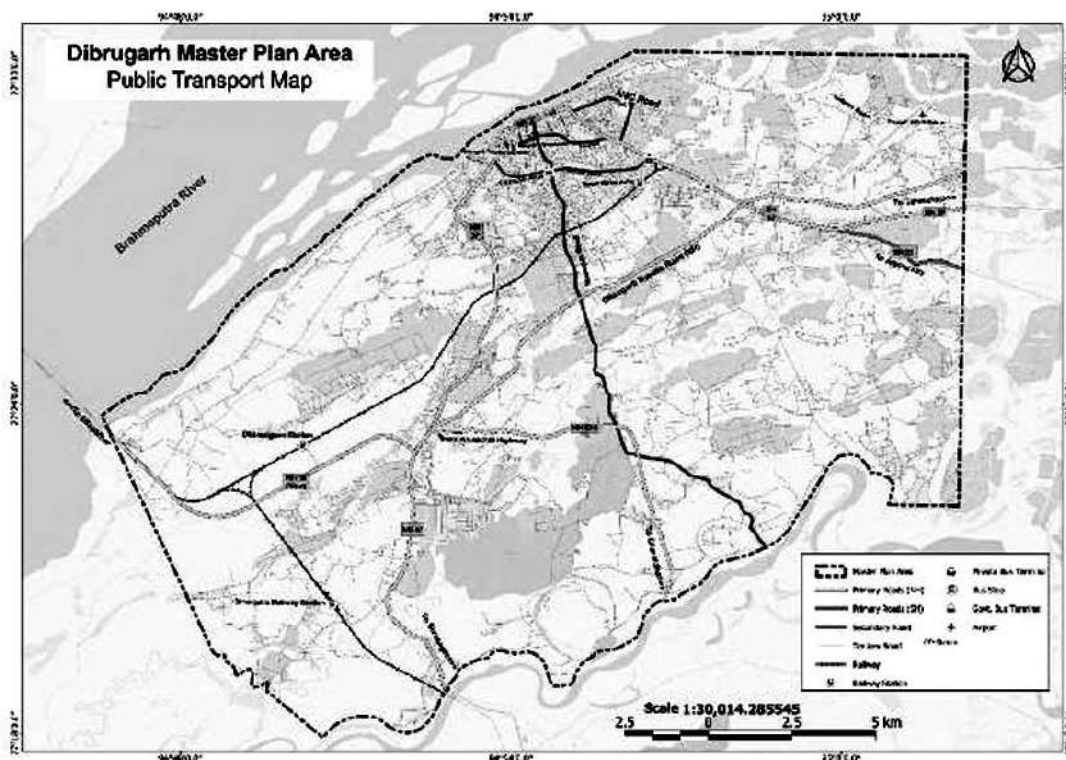


Figure 96 Bus Terminals and Railway Station in Dibrugarh MP area

7.3.1.1 Bus Terminals

The road transport system is dependent upon Buses/minibuses. Following are the bus routes for local and regional passengers. There are three bus terminals in the city, one private and two government bus terminals. The table 120 below shows the name and location of all the bus terminals.

Table 120 List of bus terminals in Dibrugarh master plan area

Bus Terminals	Name	Location
Govt. bus terminal	Murlihar Jalan Bus Terminal	along AT road and Convoy road intersection
	ASTC Bus stand	along T.R.Phukan road, Chowkidingee
	AMC Bus Station	along AMC road near AMC gateway

7.3.1.2 Railway Station

Dibrugarh has four railway stations and that has been mentioned in the table 121 below with the location. These stations are serving both passenger transportation as well as Freight transportation.

Table 121 Railway station in Dibrugarh master plan area

Railway Station	Location
Binoigutia Railway Station	Kalatmoni Gaon, Dibrugarh
Dhamalgaon Station	Dhamalgaon, Dibrugarh
Banipur Railway Station	Along Dibrugarh Station road
Dibrugarh Town	Along RKB Path

(Source: Compiled by Consultants)

7.3.1.3 Major Bus Stops

The major bus stop in the city has been mentioned in the table 122 described below. This bus stop is in the Master plan area.

Table 122 Major Bus Stops of Dibrugarh MP Area

Bus Stop	Location
ASTC bus and Chartered Bus Stops	Thana Charali (Dibrugarh)

(Source: Compiled by Consultants)

6.3.1.4 Freight Zones & Logistics

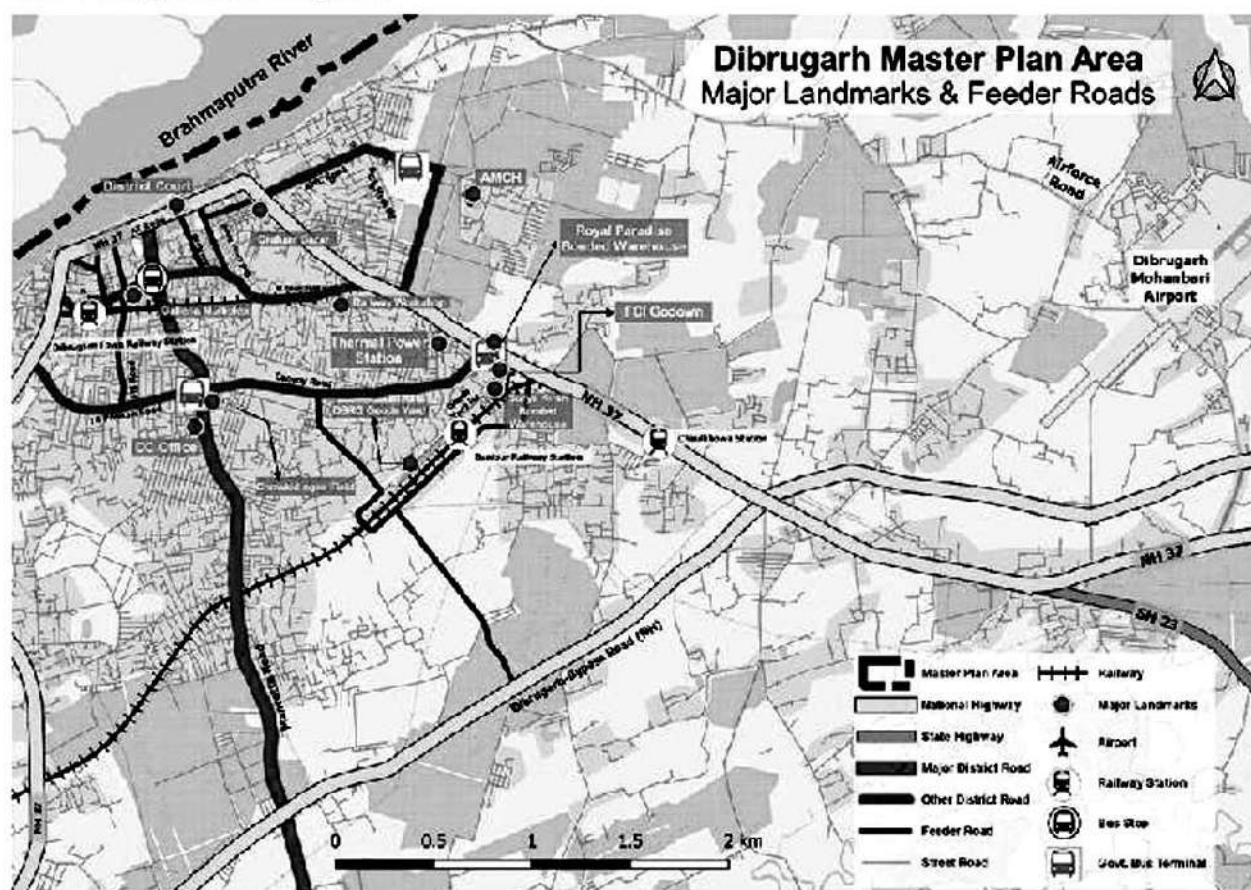


Figure 97 Warehouse and Feeder roads of Dibrugarh MP area

7.4 TRAFFIC SURVEY METHODOLOGY AND ANALYSIS

A comprehensive methodology has been evolved to carry out the work. A stepwise methodology is presented in Figure 98.

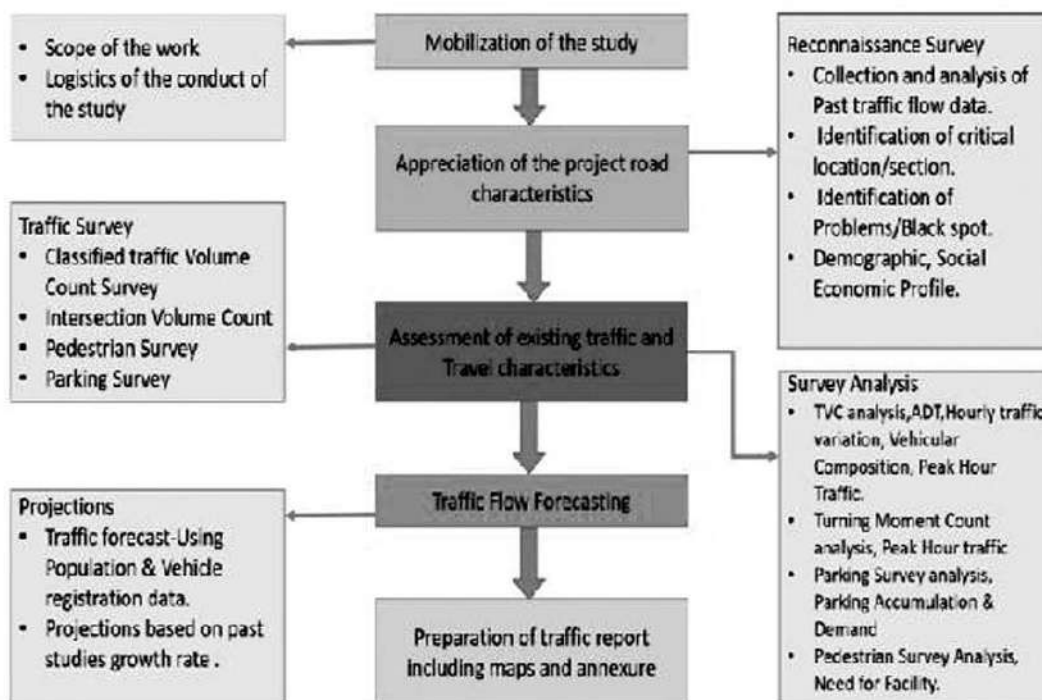


Figure 98 Traffic Survey Methodology

7.4.1 TRAFFIC SURVEY AND SCHEDULE

Classified Traffic Volume Counts (CVC's) have been conducted using manual count by trained enumerators method at different locations. The survey locations are depicted in Figure 99 Traffic survey stations have been selected by the Consultant on the basis of understanding of the road network as well as consideration of the following aspects:

- To represent critical traffic section
- To be a major influence area
- To be located at a level with good visibility

Based on the detailed reconnaissance of the project area, major traffic generators, major intersections and travel patterns, Classified Volume Count (CVC) locations and other surveys were identified at different locations. 3-Day Classified Volume Count (CVC's) and 2- day Origin and Destination (O-D) Survey at a total of 9 locations (CVC at 7 and O-D at 2 locations) in Dibrugarh Planning Area to understand traffic intensity in the Master Plan Area.

Brief description and analysis of each of the above surveys are presented in the following sections. The schedule of all traffic surveys is presented in Table 123.

Table 123 Traffic Survey Locations and Schedule

Sl. No.	Type of Survey	Location	Date
1	Classified Traffic Volume Count	NH 37 (AT Road)	27/11/20, 28/11/20
		RKB Road	27/11/20, 28/11/20
		Mancotta Road	27/11/20, 28/11/20
		Convoy Road	27/11/20, 28/11/20
		AMC Road	27/11/20, 28/11/20
		Dibrugarh Bypass Road	27/11/20, 28/11/20
2	Origin-Destination Survey	NH-37 (West)	27/11/20, 28/11/20
		NH-37 (East)	27/11/20, 28/11/20
3	Turning Movement Count (Junction Analysis)	Thana Chariali	30/11/20,01/12/20
		Chowkidingee	30/11/20,01/12/20
		Phoolbagan Tinali	30/11/20,01/12/20
		Khanikar Junction	30/11/20,01/12/20
4	Parking Survey	HS Road	25/11/20, 26/11/20
		RKB Road	25/11/20, 26/11/20
5	Pedestrian Survey	HS Road	25/11/20, 26/11/20
		New Market Road	25/11/20, 26/11/20
6	Speed Delay Survey	NH-37 (AT Road)	25/11/20, 26/11/20
		Mancotta Road	25/11/20, 26/11/20
		T R Phukan Road	25/11/20, 26/11/20
		RKB Road	25/11/20, 26/11/20

(Source: Compiled by Consultants)



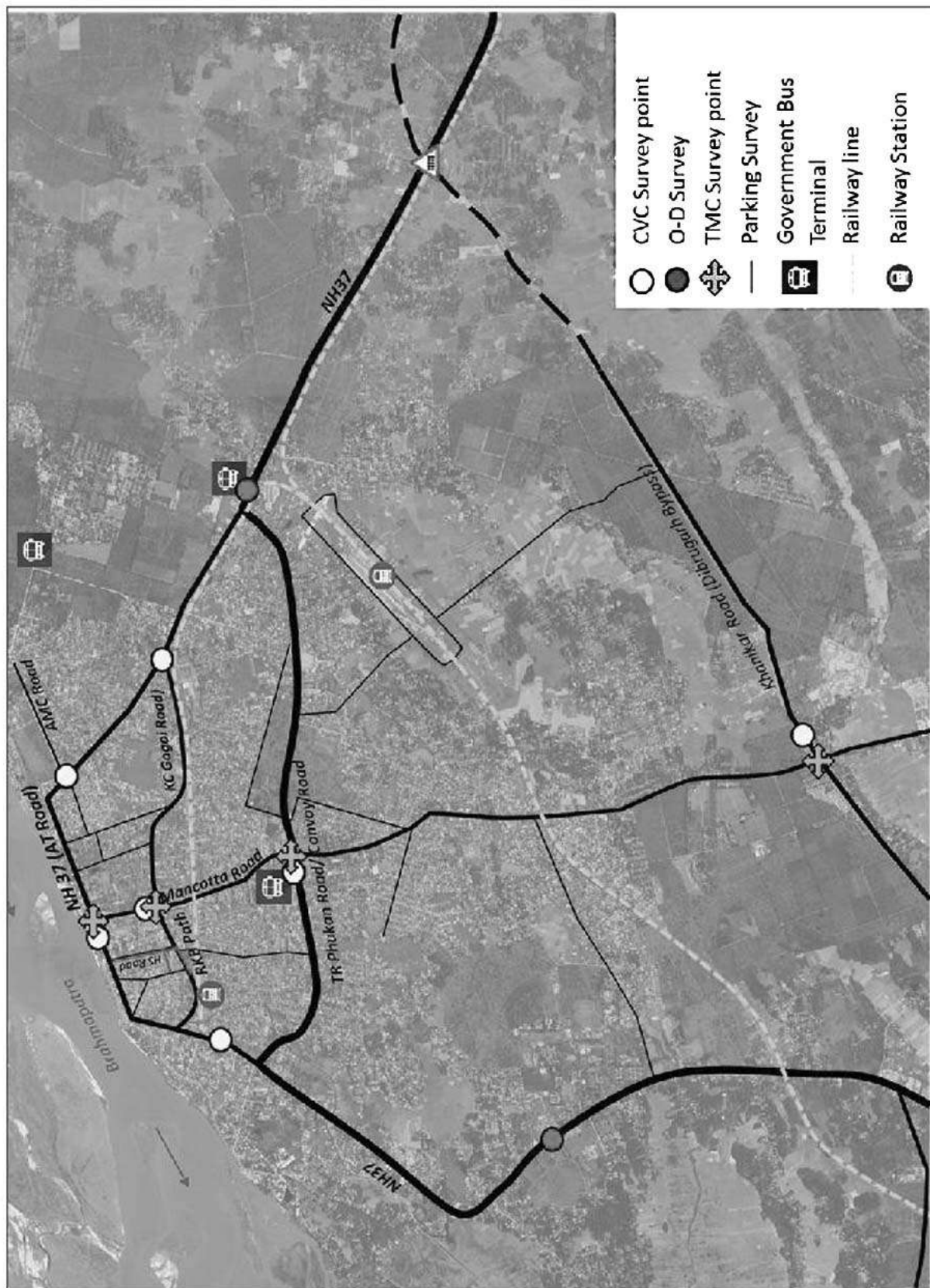


Figure 99 Traffic survey locations

7.5 TRAFFIC INTENSITY

The various vehicle types having different sizes and characteristics were converted into equivalent passenger car units. The selected survey stretches comprise both urban and rural areas. Hence PCU values were adopted from IRC 64-1990 for rural areas and IRC-106-1990 for urban areas. The PCU values used are presented in Table 124.

Table 124 vehicle classification system and PCU factors adopted for study

Sl. No.	Vehicle type	PCU factor for Urban	PCU factor for Rural
1	Car/Jeep/Van	1	1
2	Taxi	1	1
3	2-wheeler	0.75	0.5
4	3-wheeler	1.2	1
5	Minibus	1.4	1.5
6	Standard Bus	2.2	3
7	3-wheeler (Goods)	1.2	1
8	LCV	1.4	1.5
9	2 Axle	2.2	3
10	2 Axle	2.2	3
11	MAV	4	4.5
12	Tractor	1.4	1.5
13	Tractor with Trailor	4	4.5
14	Cycle	0.5	0.5
15	Other (JCB/HCM)	4	4.5

(Source: IRC 64-1990, IRC 106-1990)

Among the total road network and as per the road heirarchey, NH-37 (AT Road), K C Gogoi Road, Moncatta Road, Convoy Road, AMC Road and Grahmbazar Road have been considered as urban roads. The photographs described further mentions the different traffic surveys conducted on the inner and outer cordon points of total Master Plan area. The glimpses of traffic survey on major roads are shown below.





T R Phukan Road



RKB road



Convoy road



Nh37- Patra Gaon road



Grahambazar road



Nh37 Amolapatty road



Figure 100 Traffic Survey Photographs Nh37 Lahowal road



Nh37 Patra Gaon road

7.5.1 MANCOTTA ROAD

Annual average daily traffic is 11255 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Some LCV were present while heavy goods vehicles like 2-Axle, 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 125.

Table 125 Average Daily Traffic & Annual Average Daily Traffic on Mancotta road

Vehicle Types	ADT	AADT
Car/Jeep/Van	3817	3951
Taxi	625	874
2-wheeler	3950	4012
3-wheeler	468	477
Minibus	0	0
Standard Bus	35	41
3-wheeler (Goods)	1722	1820
LCV	257	263
2 Axle	3	5
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Trailer	0	0
Cycle	378	390
Other (JCB/HCM)	0	0
Total (Nos)	11255	11833
Total (PCU)	12665	13255

(Source: Compiled by Consultant)

7.5.1.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 126.

Table 126 Directional Distribution of Traffic on Mancotta Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Chowkidingee to Thana : Thana to Chowkidingee	Chowkidingee to Thana : Thana to Chowkidingee
Mancotta Road	54:46	53:47

(Source: Compiled by Consultant)

6.5.1.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 101. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 30% and 48% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 0.4% of traffic stream. Goods 3 wheeler vehicles comprised 13% of traffic.

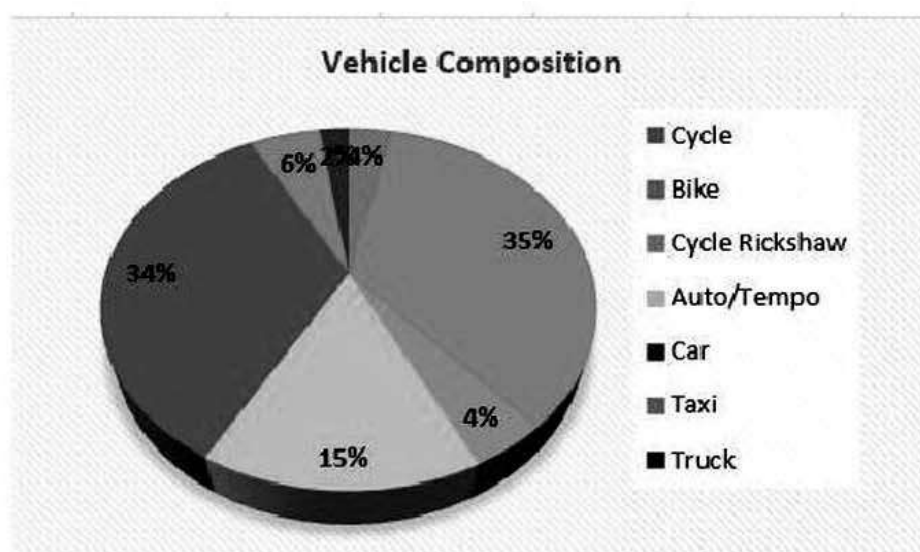


Figure 101 Composition of Traffic on Mancotta Road

(Source: Compiled by Consultant)

7.5.1.2 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at Mancotta Main Road as shown in Figure 102.

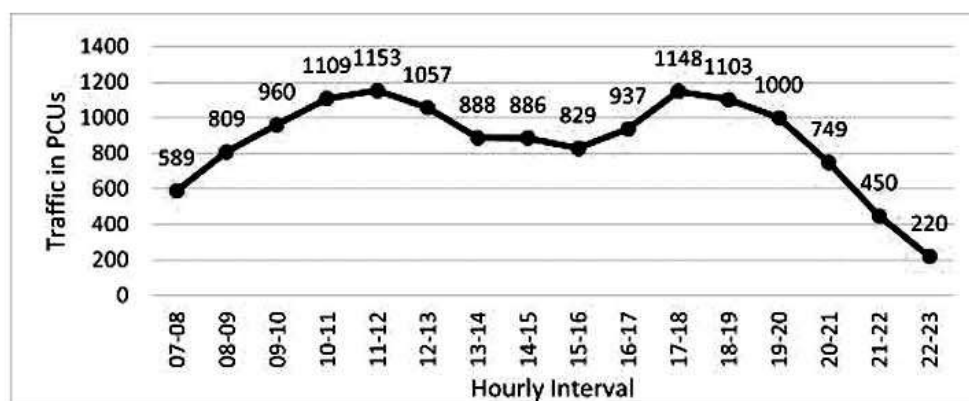


Figure 102 Hourly Variation of traffic at Mancotta road

(Source: Compiled by Consultant)

7.5.1.3 Peak Hour Traffic

Peak hour was found to be from 18:00 to 19:00 HRS. Total peak hour traffic is 1148 in PCU which is 9.1% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 127.

Table 127 Peak hour traffic on Mancotta road

PCU/hr	Peak Hours	Peak Hour Factor
1148	18:00 to 19:00	8.6

(Source: Compiled by Consultant)

7.5.2 NH 37 (AT ROAD)

Annual average daily traffic is 8162 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Some LCV were present while heavy goods vehicles like 2-Axle, 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 128.

Table 128 Average Daily Traffic & Annual Average Daily Traffic on NH 37 (AT road)

Vehicle Types	ADT	AADT
Car/Jeep/Van	2605	2715
Taxi	790	810
2-wheeler	3402	3512
3-wheeler	163	174
Minibus	17	19
Standard Bus	15	20
3-wheeler (Goods)	1094	1103
LCV	154	160
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Tractor	0	0
Cycle	347	352
Other (JCB/HCM)	0	0
Total (Nos)	8587	8865
Total (PCU)	7901	8162

Source: Compiled by Consultant)

7.5.2.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 129.

Table 129 Directional Distribution of Traffic on NH 37 (AT Road)

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Panchali to Phoolbagan : Phoolbagan to Panchali	Panchali to Phoolbagan : Phoolbagan to Panchali
NH 37 (AT Road)	53:47	52:48

Source: Compiled by Consultant)

7.5.2.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 103. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 40% and 39% of total traffic. Thus, commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 0.1% of traffic stream. Goods 3 wheeler vehicles comprised 13% of traffic, whereas trucks are 2% of total.

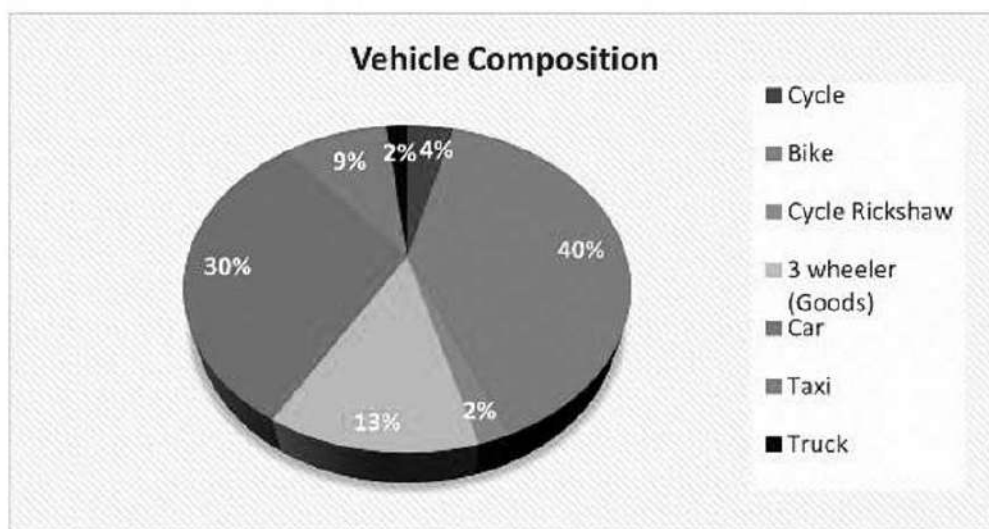


Figure 103 Composition of Traffic on NH 37 (AT Road)

Source: Compiled by Consultant)

7.5.2.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at Mancotta Main Road as shown in Figure 104.

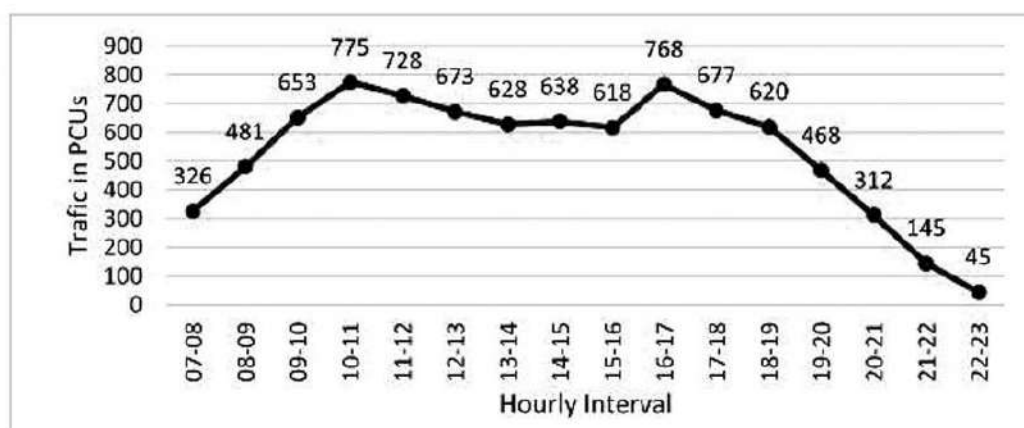


Figure 104 Hourly Variation of traffic at NH 37 (AT road)

Source: Compiled by Consultant)

7.5.2.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 775 in PCU which is 9.0% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 130.

Table 130 Peak hour traffic on NH37 (AT Road)

PCU/hr	Peak Hours	Peak Hour Factor
775	10:00 to 11:00	9.0

Source: Compiled by Consultant)

7.5.3 CONVOY ROAD

Annual average daily traffic is 5449 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Some LCV were present while heavy goods vehicles like 2-Axle, 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 131.

Table 131 Average Daily Traffic & Annual Average Daily Traffic on Convoy road

Vehicle Types	ADT	AADT
Car/Jeep/Van	2129	2234
Taxi	798	810
2-wheeler	1081	1120
3-wheeler	182	190
Minibus	0	0
Standard Bus	25	26
3-wheeler (Goods)	594	602
LCV	156	160
2 Axle	104	119
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Tractor	0	0
Cycle	134	144
Other (JCB/HCM)	0	0
Total (Nos)	5203	5405
Total (PCU)	5238	5449

Source: Compiled by Consultant)

7.5.3.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 132.

Table 132 Directional Distribution of Traffic on Convoy Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PUC
	Chowkidingee to Podum Nagar 2 : Podum Nagar 2 to Chowkidingee	Chowkidingee to Podum Nagar 2 : Podum Nagar 2 to Chowkidingee
Convoy Road	54:46	54:46

Source: Compiled by Consultant)

7.5.3.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 105. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 21% and 59% of total traffic. Thus commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 0.1% of traffic stream. Goods 3 wheeler vehicles comprised 12% of traffic, whereas trucks are 2% of total.

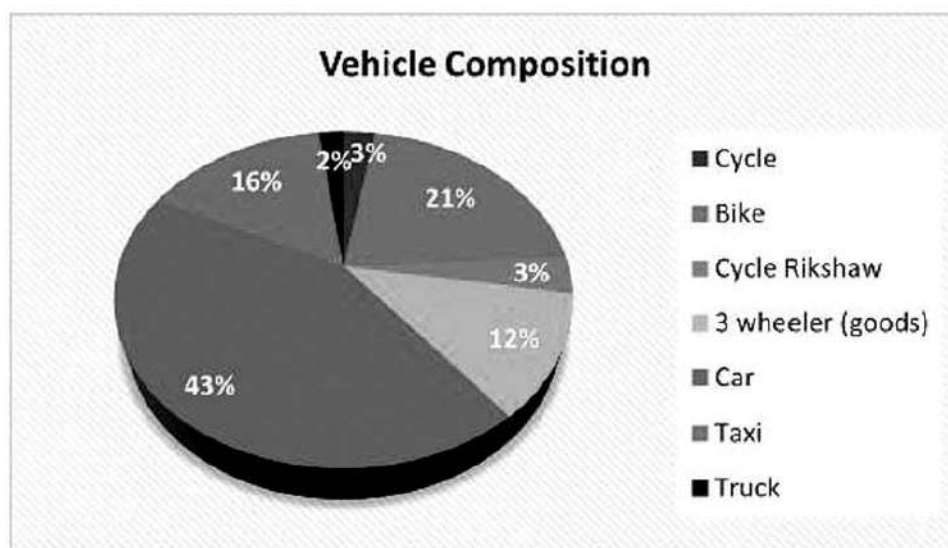


Figure 105 Composition of Traffic on Convo Road

Source: Compiled by Consultant)

7.5.3.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at Convo Main Road as shown in Figure 106.

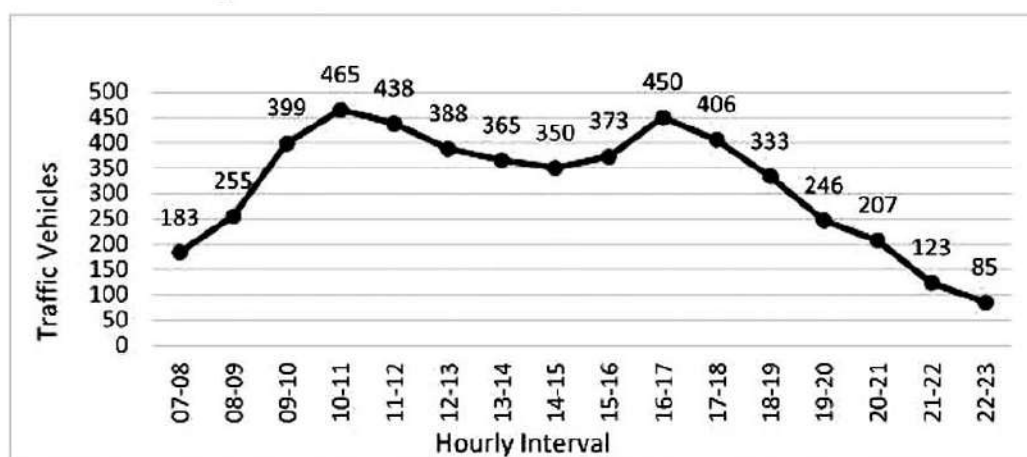


Figure 106 Hourly Variation of traffic at Convo road

Source: Compiled by Consultant)

7.5.3.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 465 in PCU which is 9.0% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 133.

Table 133 Peak hour traffic on Convo Road

PCU/hr	Peak Hours	Peak Hour Factor
465	10:00 to 11:00	9.2

Source: Compiled by Consultant)

7.5.4 RKB ROAD

Annual average daily traffic is 11091 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Goods 3-wheeler vehicles were present in good number while heavy goods vehicles like 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 134.

Table 134 Average Daily Traffic & Annual Average Daily Traffic on RKB road

Vehicle Types	ADT	AADT
Car/Jeep/Van	3231	3250
Taxi	1335	1415
2-wheeler	4598	4610
3-wheeler	410	416
Minibus	0	0
Standard Bus	0	0
3-wheeler (Goods)	1402	1475
LCV	0	0
2 Axle	220	215
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Trailer	0	0
Cycle	446	453
Other (JCB/HCM)	0	0
Total (Nos)	11642	11834
Total (PCU)	10896	11091

(Source: Compiled by Consultant)

7.5.4.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 135.

Table 135 Directional Distribution of Traffic on RKB Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Boga baba Tinali to Thana Charali : Thana Charali to Boga baba Tinali	Boga baba tinali to Thana Charali : Thana Charali to Boga baba Tinali
RKB Road	54:46	54:46

(Source: Compiled by Consultant)

7.5.4.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 107. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 39% and 39% of total traffic. Thus commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 0.1% of traffic stream. Goods 3 wheeler vehicles comprised 12% of traffic, whereas trucks are 2% of total.

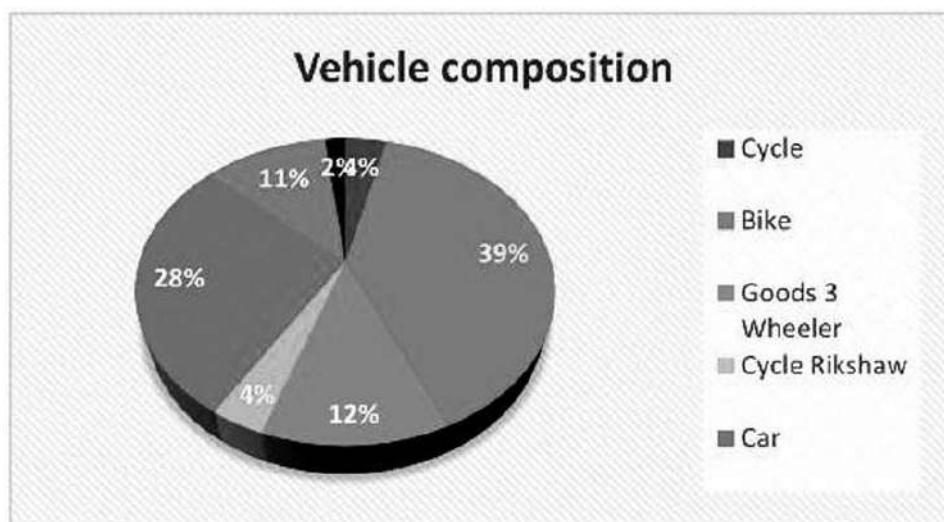


Figure 107 Composition of Traffic On RKB Road

Source: Compiled by Consultant)

7.5.4.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at RKB Main Road as shown in Figure 108.

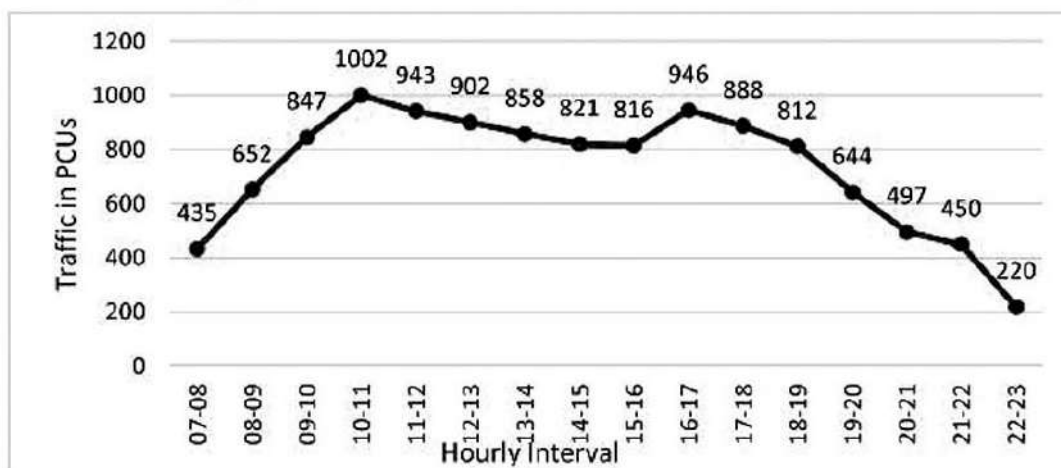


Figure 108 Hourly Variation of traffic at RKB road

Source: Compiled by Consultant)

7.5.4.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 1002 in PCU which is 8.6% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 136.

Table 136 Peak hour traffic on RKB Road

PCU/hr	Peak Hours	Peak Hour Factor
1002	10:00 to 11:00	8.6

Source: Compiled by Consultant)

7.5.5 AMC ROAD

Annual average daily traffic is 9506 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in less volume. Goods 3 wheeler vehicles were present in good number while heavy goods vehicles like 3 Axle, MAV were not much observed. ADT and AADT by vehicle type is presented in Table 137.

Table 137 Average Daily Traffic & Annual Average Daily Traffic on AMC road

Vehicle Types	ADT	AADT
Car/Jeep/Van	3771	3801
Taxi	1072	1103
2-wheeler	3611	3681
3-wheeler	163	170
Minibus	0	0
Standard Bus	0	0
3-wheeler (Goods)	1094	1102
LCV	0	0
2 Axle	0	0
3 Axle	0	0
MAV	0	0
Tractor	0	0
Tractor with Tractor	0	0
Cycle	602	630
Other (JCB/HCM)	0	0
Total (Nos)	10313	10487
Total (PCU)	9361	9506

(Source: Compiled by Consultant)

7.5.5.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 138.

Table 138 Directional Distribution of Traffic on AMC Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	NH 37 (Graham bazar) to Paltan Bazar : Paltan Bazar to NH 37 (Graham bazar)	NH 37 (Graham bazar) to Paltan Bazar : Paltan Bazar to NH 37 (Graham bazar)
AMC Road	51:49	52:48

7.5.5.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 109. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 35% and 46% of total traffic. Thus commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 0.1% of traffic stream. Goods 3 wheeler vehicles comprised 10% of traffic, whereas trucks are 1% of total.

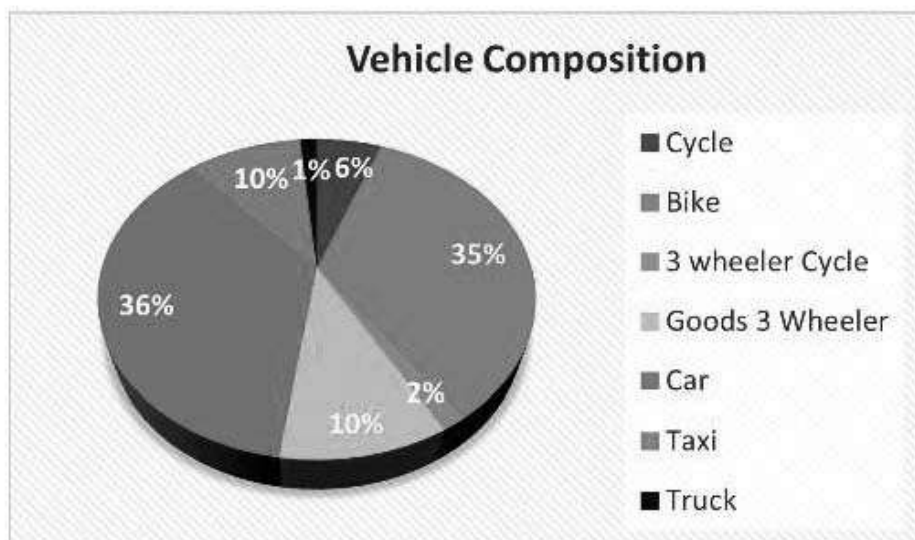


Figure 109 Composition of Traffic On AMC Road

7.5.5.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at AMC Main Road as shown in Figure 110.

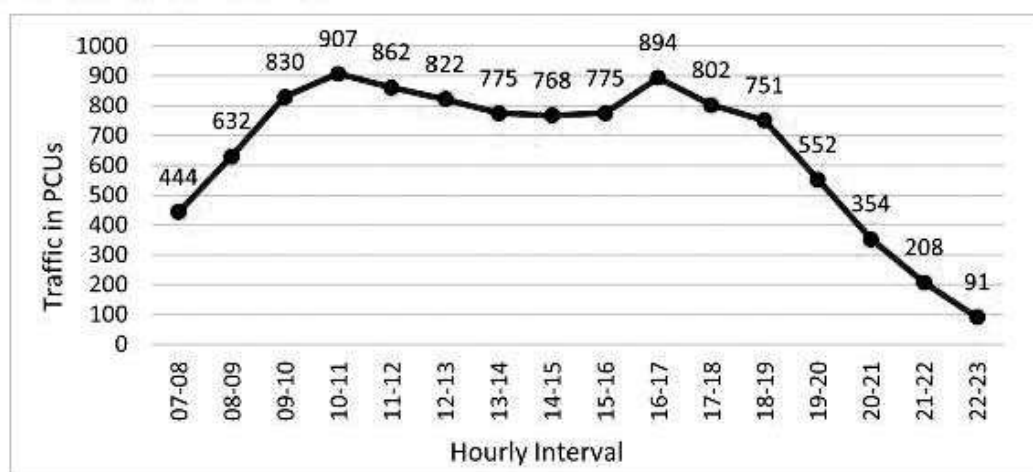


Figure 110 Hourly Variation of traffic at AMC road

7.5.5.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 907 in PCU which is 8.6% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 139.

Table 139 Peak hour traffic on AMC Road

PCU/hr	Peak Hours	Peak Hour Factor
907	10:00 to 11:00	8.6W

7.5.6 DIBRUGARH BYPASS ROAD

Annual average daily traffic is 4595 PCU in this road section. Passenger vehicles like car/taxi/utility vehicles, two wheelers predominate the traffic stream. Non-Motorised vehicles were observed in medium volume. LCV vehicles were present in good number while heavy goods vehicles like 3 Axle, MAV were observed here due to outer road links with other districts. ADT and AADT by vehicle type is presented in Table 140.

Table 140 Average Daily Traffic & Annual Average Daily Traffic on Dibrugarh bypass road

Vehicle Types	ADT	AADT
Car/Jeep/Van	1204	1250
Taxi	1012	1040
2-wheeler	1078	1045
3-wheeler	619	607
Minibus	20	15
Standard Bus	11	14
3-wheeler (Goods)	11	6
LCV	218	225
2 Axle	32	35
3 Axle	47	51
MAV	8	8
Tractor	24	27
Tractor with Trailer	0	0
Cycle	315	320
Other (JCB/HCM)	0	0
Total (Nos)	4599	4643
Total (PCU)	4535	4595

(Source: Compiled by Consultant)

7.5.6.1 Directional Split

The traffic data was analyzed to establish the directional distribution of traffic. The directional distribution of traffic at the TVC location is given in Table 141.

Table 141 Directional Distribution of Traffic on Dibrugarh bypass Road

TVC Location	Directional distribution in vehicle numbers	Directional distribution in PCU
	Mancotta Road to Chaulkhowa : Chaulkhowa to Mancotta Road	Mancotta Road to Chaulkhowa : Chaulkhowa to Mancotta Road
Dibrugarh bypass Road	52:48	53:47

(Source: Compiled by Consultant)

7.5.6.2 Vehicle Composition

Composition of traffic at the midblock location is presented in Figure 111. Road section is occupied by mainly two-wheeler and car/taxi/utility vehicles which are 30% and 33% of total traffic. Thus commuters are using their personal vehicles to a large extent for daily routine. Public transport (bus) was observed to be less at 1% of traffic stream. LCV vehicles comprised 6% of traffic, whereas trucks are 3% of total.

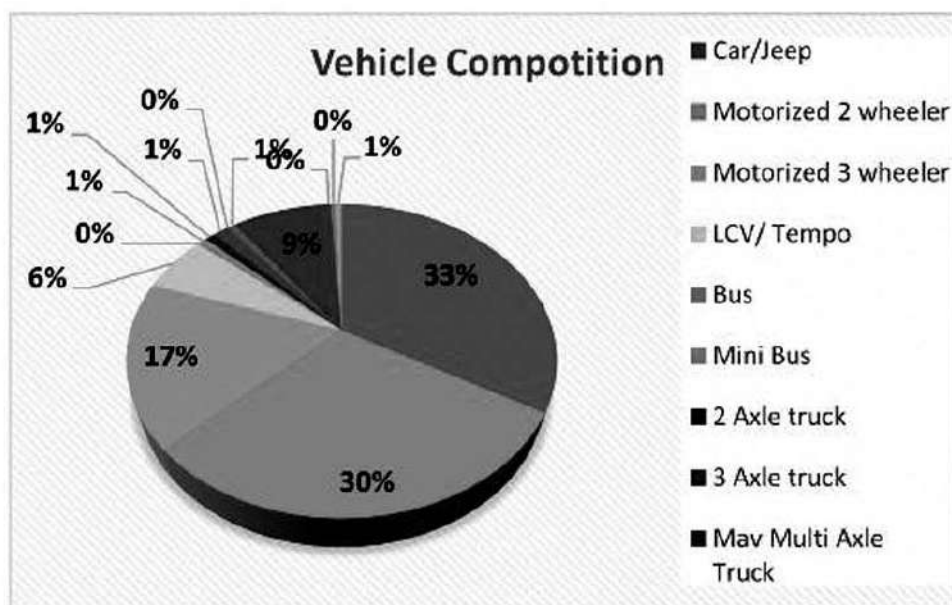


Figure 111 Composition of Traffic on Dibrugarh bypass Road

7.5.6.3 Hourly Variation of Traffic

The hourly distribution of traffic to understand hourly variation and peak hour traffic characteristics at Bypass Road as shown in Figure 112.

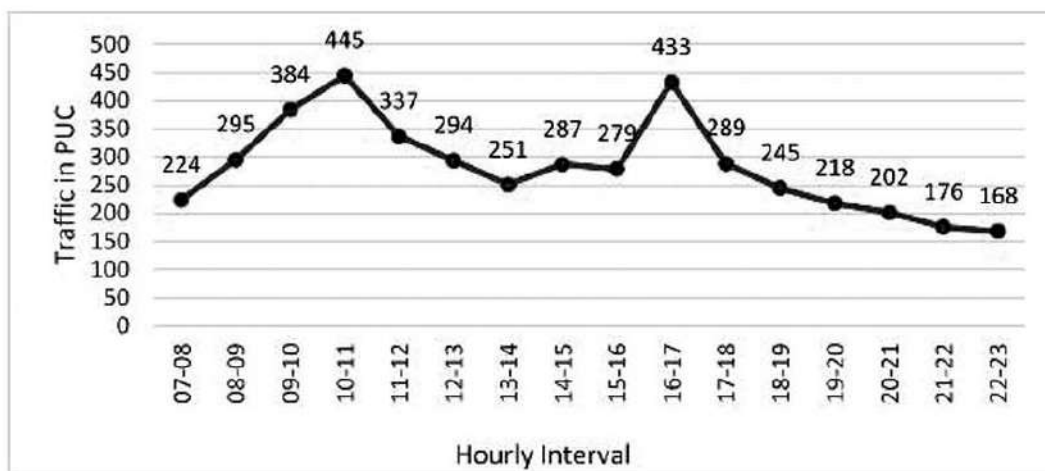


Figure 112 Hourly Variation of traffic at Dibrugarh bypass road

(Source: Compiled by Consultant)

7.5.6.4 Peak Hour Traffic

Peak hour was found to be from 10:00 to 11:00 HRS. Total peak hour traffic is 445 in PCU which is 12.28% of ADT. The peak hour and peak hour traffic at the midblock location is presented in Table 142.

Table 142 Peak hour traffic on Dibrugarh bypass Road

PCU/hr	Peak Hours	Peak Hour Factor
445	10:00 to 11:00	12.28

(Source: Compiled by Consultant)

7.5.7 TRAFFIC CONGESTION

Traffic congestion takes place when traffic spills over than the design capacity of any road. The severity of traffic congestion can be identified using average daily traffic count and volume by capacity ratio method. Ratio greater than 1 indicates sever congestion, 0.75 to 1 indicates heavy congestion, 0.50 to 0.75 indicates moderate congestion and less than 0.5 considered as low congestion.

Table 143 V/C ratio on Major roads

Sl. No.	Location	ADT	V/C
1	Mancotta Road	11255	0.65
2	NH 37 (AT Road)	8587	0.6
3	Chowkidingee	13833	0.79
4	Convoy Road	5203	0.3
5	RKB Road	11642	0.66
6	AMC Road	10313	0.59
7	Dibrugarh Bypass Road	4599	0.31

(Source: Compiled by Consultant)

Form the analysis mentioned in above Table 143 it can be inferred that the patches of Mancotta road at Thana Chariali and Chowkidingee are congested with heavy traffic. During pick hours (8 to 10am and 1 to 3 pm) K.C.Gogoi road observes heavy traffic due to Collage attendees. Moderate congestion observed at major junctions of NH 37 (AT road), RKB road and AMC road. East junction patch of Convoy road and Dibrugarh bypass road junction are under low congestion factor.

7.5.8 OVERVIEW OF CRITICAL ROADS

Road capacity in general refers to the maximum traffic flow obtainable on a given roadway using all available lanes. Critical roads depend upon several factors, mainly, traffic conditions, road geometry characteristics, environmental factors etc. The critical assessment of road capacities on major urban roads is carried out by field traffic surveys to capture the classified volume count for primary, secondary and tertiary roads spread across the city through manual as well as video graphic techniques. Based on the collected data, the existing traffic volume per lane was ascertained during peak hours. This has been compared with the maximum Road capacity values to critically analyse the existing capacity potential of major roads in the city. Based on our study, the critical roads were observed and depicted in figure given below. The critical roads, depicted with blue color in the map, include NH 37 (AT Road), AMC Road, Mancotta – Convoy Road, RKB Path. However, major congestion issues were found in these roads leading to critical roads.



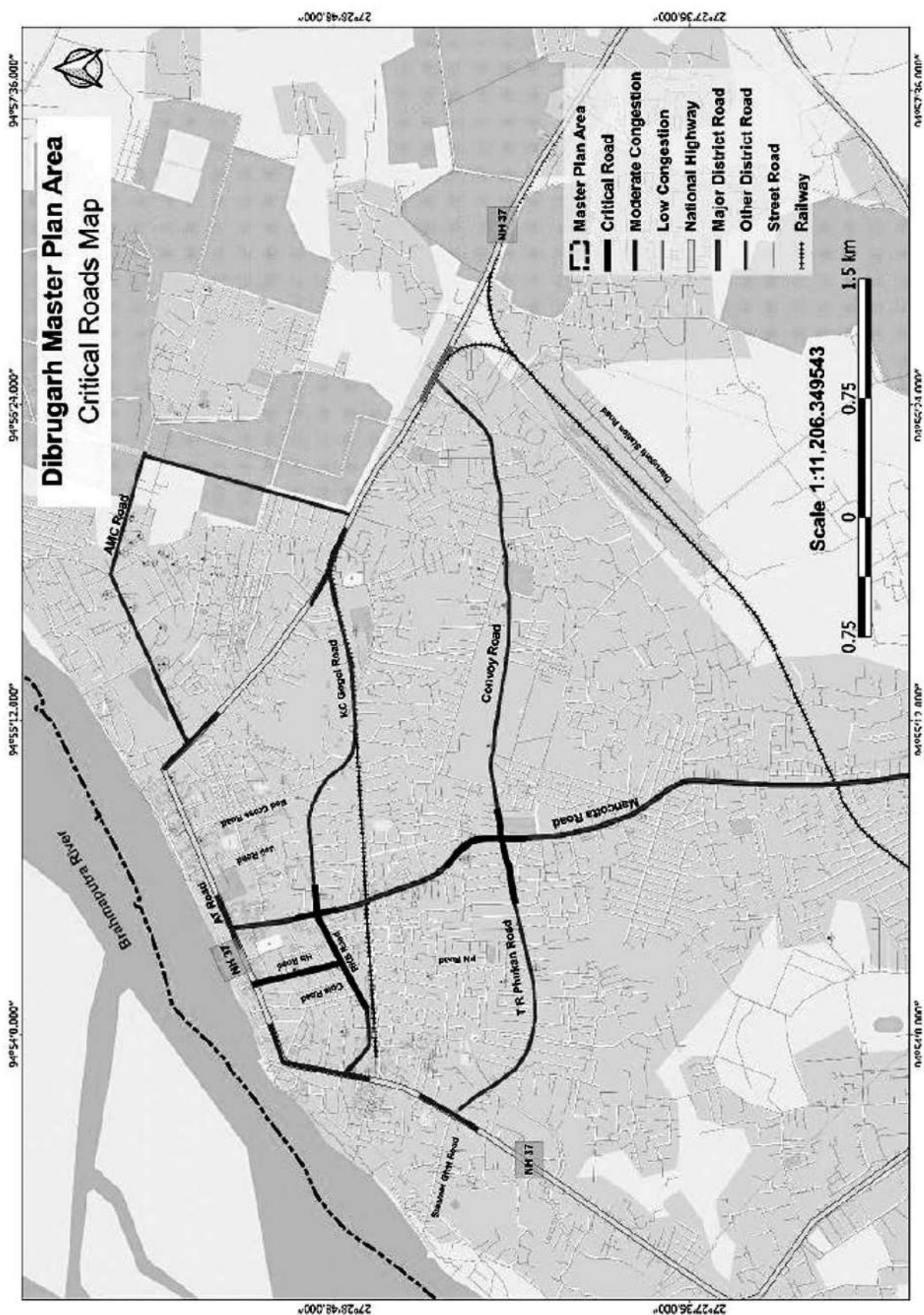


Figure 113 Congestion severity on Major roads

7.6 VEHICULAR TRAVEL PATTERN

The travel pattern of vehicles in the project area was studied. The data collected from the field was subsequently grouped according to origin and destination of vehicles, which led to development of the zoning system. The Roadside Interview method, as detailed in IRC: 102-1988, has been adopted for O-D survey. The survey has been carried out for both passenger and goods vehicles for 12 hours (in both directions). For this purpose, cars (including new and old technology cars) and buses were considered as passenger vehicles. Similarly, LCVs, 2-Axle Trucks, 3-Axle Trucks, 4-6 Axle Trucks and ≥ 7 -Axle Trucks were considered as goods vehicles. Trained enumerators under the supervision of Traffic Police collected the travel information.

7.6.1 ZONING SYSTEM

Origin-Destination (OD) analysis is required for designation of the PIA in terms of codified origin and destination zones. It is thus important to code the trips recorded at site for origin and destination zones. The zoning, emanating from the understanding of the surrounding road network and the travel pattern of the vehicles by the consultants, was done in four levels. In the first level, all-important towns located along the study stretches were assigned zone code. Secondly, immediate influence areas of study stretches were considered and nearby areas/ towns were defined as.

7.6.2 DATA CODING AND CHECKING

The collected data were coded and computerized. Checking of data for incorrect entries and coding was carried out by cross checking with original field data sheets. The data were also checked for inconsistencies. The checking included:

- Code number exceeding highest code
- Matching vehicle type with commodity carried
- Vehicle type with their corresponding load/occupancy for any inconsistencies

7.6.3 DEVELOPMENT OF ORIGIN-DESTINATION MATRICES

After coding of Origin and Destination data, expansion factors were calculated by comparing the sample size collected for each vehicle type with traffic count data. After calculating expansion factors, vehicle wise O-D matrices were developed. On the basis of O-D matrices, travel pattern of the vehicles moving on the project road was determined. The O-D matrices of all 5 locations were combined to arrive at the project O-D matrix.

7.6.4 COMMODITY ANALYSIS

Commodity movement pattern shows that there is considerable movement of mining products, food grains & other agricultural products, finished & manufactured products and building materials. A large proportion of empty vehicles were also recorded. Mode-wise distribution of various commodities is presented in Table 144.

Table 144 Vehicle Wise Commodity Distribution (In Percentage)

Sl. No.	Commodity Analysis	LCV	MCV	HCV	MAV
1	Food grains, other agricultural products	8	3	0	0
2	Fruits, vegetables - perishables	4	1	0	0
3	Wood, Forest Products	3	0	0	0
4	Petroleum, oil, gas, lubricants	3	0	0	0
5	Minerals, chemicals, fertilizer	2	0	0	0
6	Iron , metal, steel	3	0	0	0
7	Finished & manufactured products	6	4	0	0
8	Building materials	3	3	0	0
9	Mining materials (Sand, Bajri, Coarse Aggregate)	14	4	0	1
10	Cement	4	0	0	0
11	Miscellaneous goods (Livestock, Waste, paper etc)	5	1	0	0
12	Empty vehicles	22	5	1	0

(Source: Compiled by Consultant)



7.7 ORIGIN-DESTINATION SURVEY

7.7.1 PASSENGER VEHICLE

The analysis of passenger vehicles shows that maximum traffic (35%) circulates within Dibrugarh City. Traffic between Dibrugarh City and Rest of Dibrugarh District is 18% and that between Dibrugarh and Tinsukia are 14% each. 13% traffic ply between Dibrugarh and North-Lakhimpur. Spatial distribution of passenger trips is presented in Table 145.

Table 145 Major Distribution of Passenger Vehicle

Between	% Share
Within Dibrugarh City	35
Dibrugarh City - within rest of District	18
Dibrugarh to Tinsukia	14
Dibrugarh to North Lakhimpur	13
Dibrugarh to Dhemaji	12
Dibrugarh to Sivasagar	8

(Source: Compiled by Consultant)

7.7.2 FREIGHT VEHICLES

Analysis of goods vehicles shows that 32% trips are between Dibrugarh City and Rest of Dibrugarh district and 14% are with Tinsukia district. The trips with Dibrugarh City and North Lakhimpur were recorded at 12% and those between Dibrugarh and Sivasagar at 13%. Table 146 shows the distribution of freight trips.

Table 146 Major Distribution of Freight Vehicle

Between	% Share
Within Dibrugarh City	12
Dibrugarh City - within rest of District	32
Dibrugarh to Tinsukia	14
Dibrugarh to North Lakhimpur	12
Dibrugarh to Dhemaji	8
Dibrugarh to Guwahati	9
Dibrugarh to Sivasagar	13

(Source: Consultant Compilation)

7.7.3 OCCUPANCY AND TRIP PURPOSE

The analysis of OD data for passenger cars and buses shows that the average occupancy for these vehicles along the project road is 4 and 30. It is observed that the major share of trips is related to work. The distribution of car passengers by trip purpose is shown in Table 147.

Table 147 Distribution of Car Passengers by Trip Purpose

Trip Purpose	% Trips
Work	88
Business	9
Education	1
Others	2

(Source: Consultant Compilation)

7.8 JUNCTION ANALYSIS

The areas with major traffic congestion have been marked (refer figure 116) with red spots. These are the areas where most of the problems generate due to various reasons and lead to congestion. These areas include AT – Mancotta Road Junction, Amolapatty Chariali, Convoy Road Junction, Gabharupothar Junction, Thana Chariali, RKB and AT Road Junction, Chowkidinghee Chariali, HS Road and RKB Path Junction, HS Road and RKB Path Junction. Moreover, K.C.Gogoi road advocates heavy traffic in pick hours due to presence of schools and collages along right of way. Being potential medical hub of entire upper Assam, patches like Graham Bazar tiniali to AMC Road leading max. traffic due to presence of more than 10 nursing homes. Patients from Dhemaji, Lakhimpur and Arunachal prefers this place for any medical emergencies considering prime institutes like AMC Collage and Private Health Centres.

7.8.1 ALL OBSERVED JUNCTIONS

All the differentiated categories of junctions have been mentioned in the tabled below. Table 148 represents the roundabouts and rotaries, table 149 represents all the cross junctions, table 150 shows the Y-junctions and table 151 shows the T-junctions in Dibrugarh Master plan area.

Table 148 List of Rotaries in Dibrugarh MP area

Sl. No.	Roundabouts/Rotary
1.	Thana Charali
2.	Chowkidingee Clock Tower
3.	NH 37 – Dibrugarh Bypass Road – NH 52B

(Source: Consultant Compilation)

Table 149 List of cross junctions in Dibrugarh MP area

Sl. No.	Cross Junctions
1.	Mancotta road – Dibrugarh bypass road
2.	NH 37 (AT road) – HS road
3.	Dibrugarh bypass road – Airforce road
4.	Mancotta road – NH 52B road
5.	Dibrugarh bypass road – NH 37
6.	Leela Gogoi path – Mancotta road

Table 150 List of Y - Junctions in Dibrugarh MP area

Sl. No.	Y - Junction
1.	NH 37 road – RKB path
2.	K.C Gogoi path – NH 37 (Gabharu Pathar)
3.	Dulianjan Dibrugarh road (NH 37)– Lahoal Dhulianjan road (SH 23)
4.	Lahor patty – Cole Road
5.	Red Cross road – K.C. Gogoi path
6.	NH 37 – TR Phukan road

(Source: Compiled by Consultants)

Table 151 List of T - Junctions in Dibrugarh MP area

Sl. No.	T - Junction
1.	NH 37 (AT road) – AMC road
2.	TR Phukan road – PN road
3.	NH 37(Graham Bazar road)– K.C.Gogoi
4.	NH 37 – NH 15 (new)
5.	Mancotta road – NH 37(AT road)
6.	NH 37 (AT Road) - HS road
7.	NH 37 (AT road) – Cole road
8.	NH 37 (AT road) – Jail road
9.	Dibrugarh Bypass – NH 37 (Link road)
10.	Red Cross road – Jain mandir road
11.	Red Cross road – Shiv mandir road
12.	Red Cross road – NH 37 (AT road)

(Source: Compiled by Consultants)

The map below shows the analysis of junctions whether the junction is cross junction, T-junction, Y-junction, or Rotary (refer figure 114).

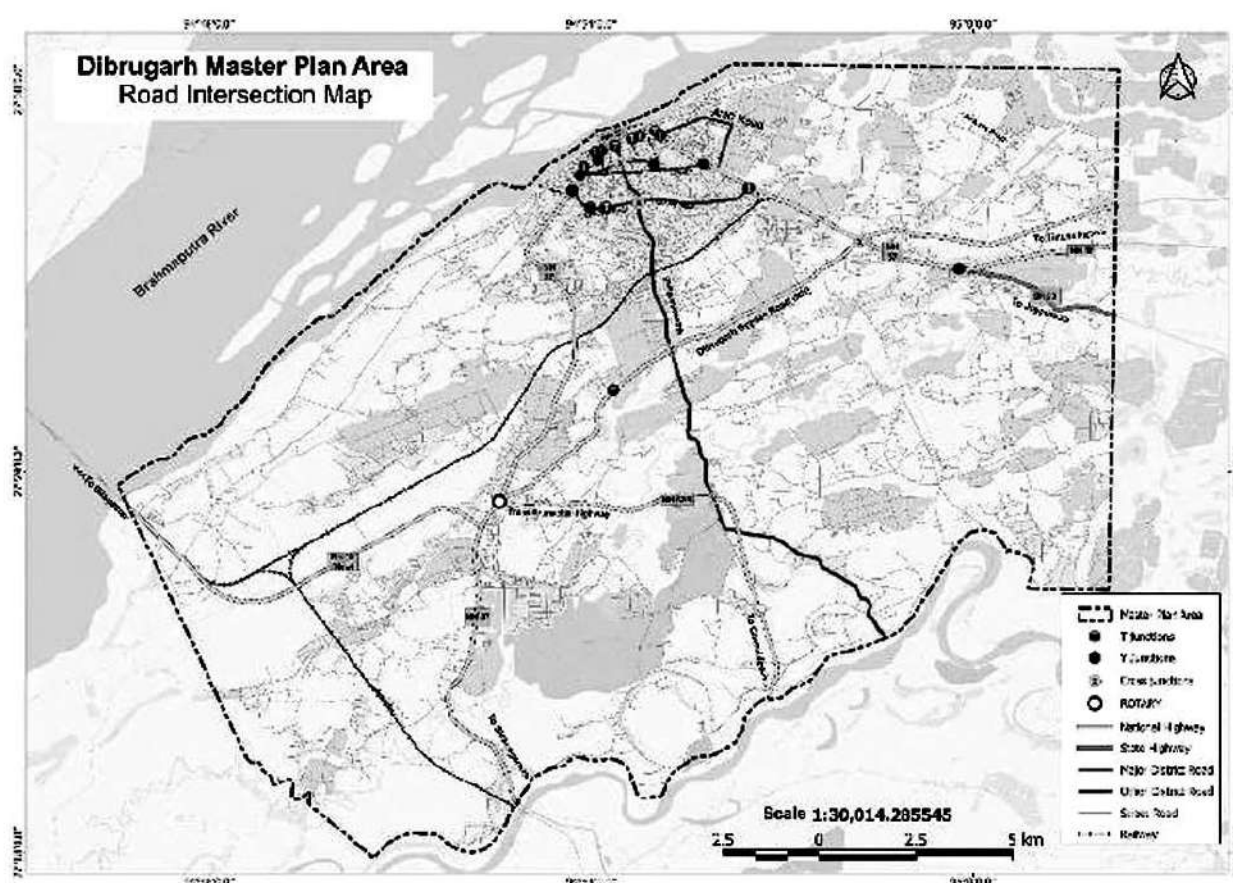


Figure 114 Road intersection map of Dibrugarh MPA

Major intersection nodes of DMPA are described in Fig 114 and the points selected for intersection (Junction) analysis are marked in Fig. 115.

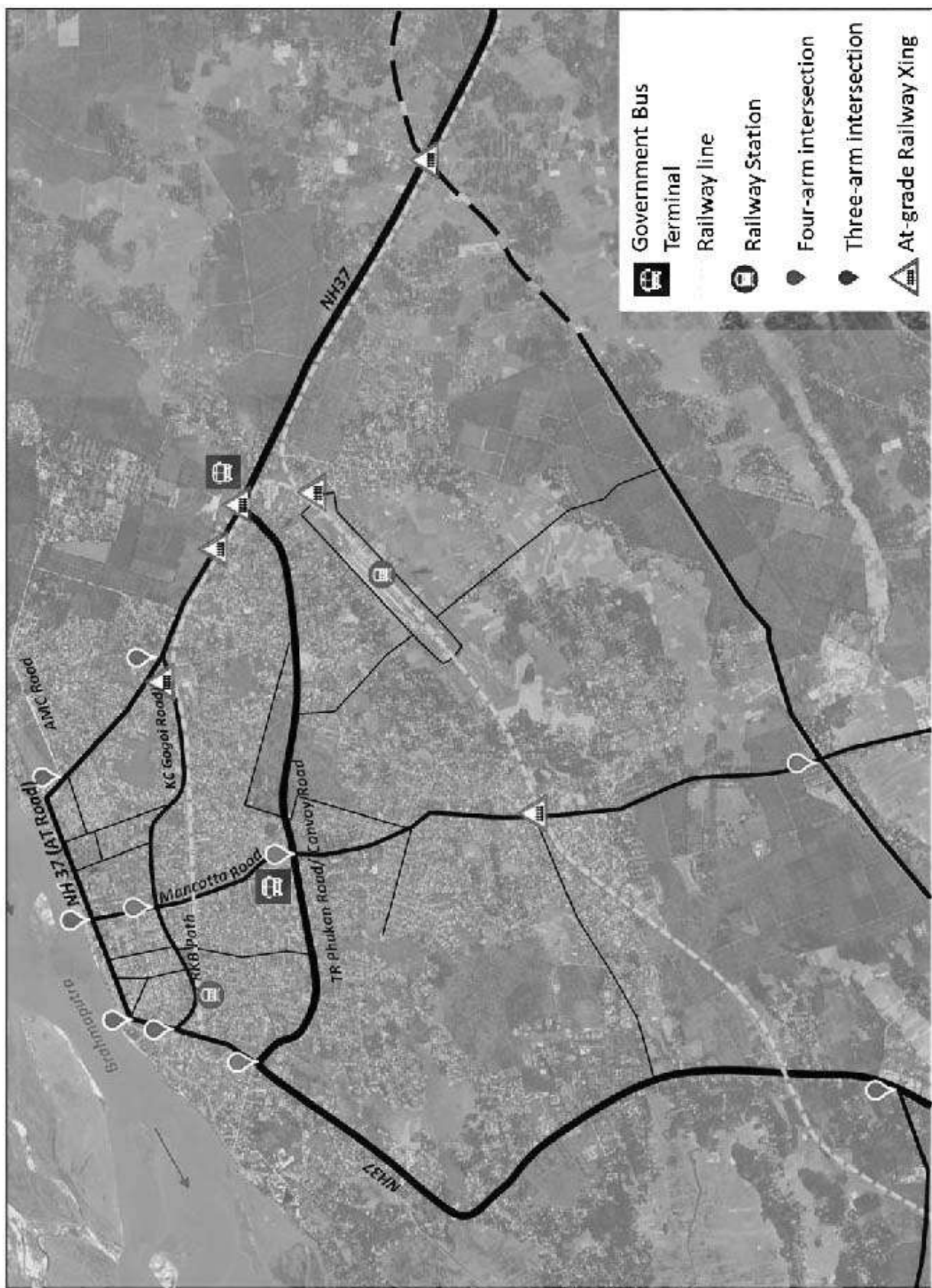
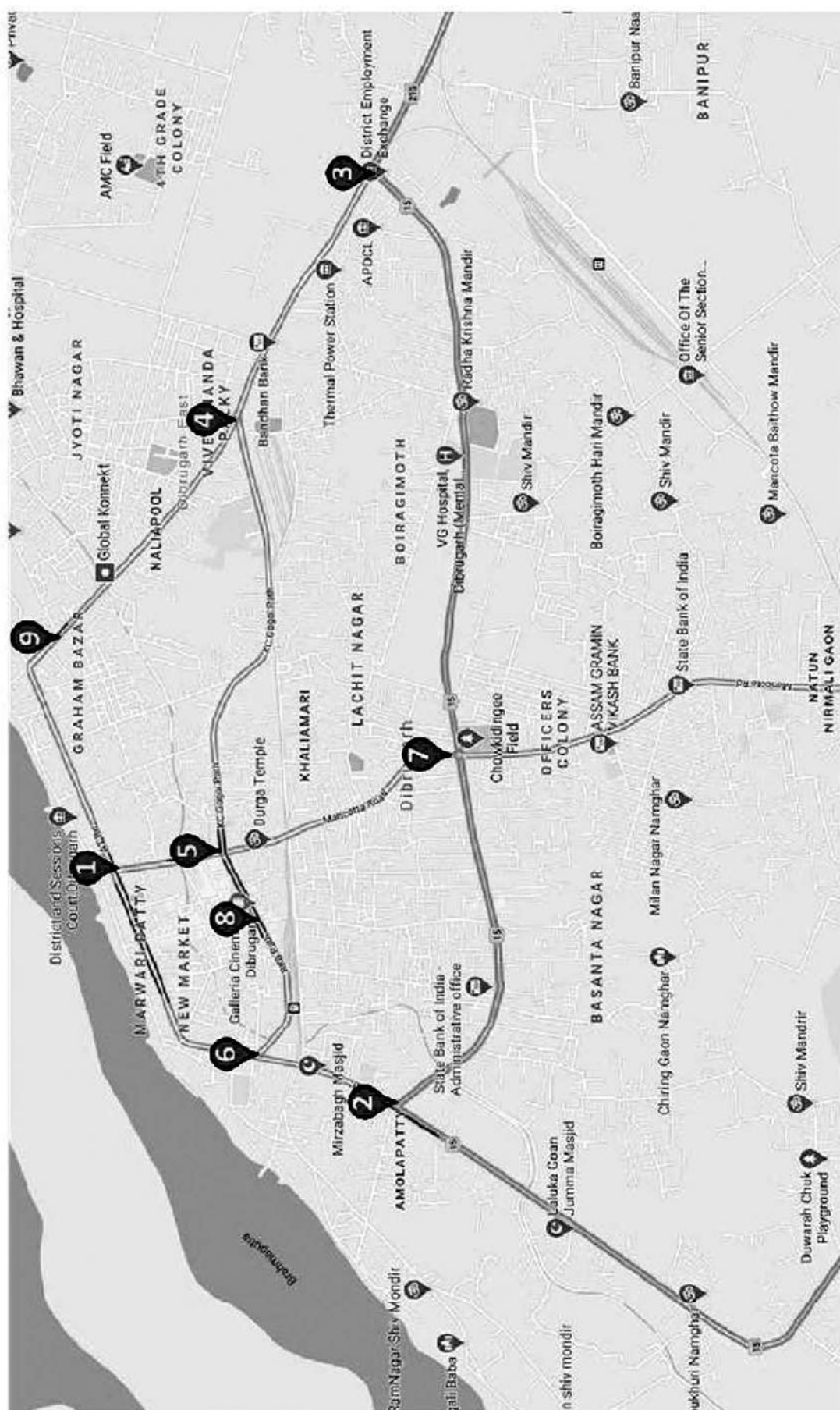


Figure 115 Major nodes of intersection



7.8.2 INTERSECTION - 1 MANCOTTA ROAD JUNCTION)

Table 152 Intersection 1 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
NH 37 (AT Road)	14	2 lane Undivided Two-way	5	11:30 hrs. & 17:30 hrs.
Mancotta Road	10	2 lane Undivided Two-way	6	

(Source: Compiled by Consultants)



Figure 117 Queuing Length of Intersection 1

This Junction is a 3-Arm junction and the total daily traffic at NH 37 (AT road) -Mancotta Junction is 8162 PCU. The peak hour and peak hour traffic at the junction is presented in Table 153.

Table 153 Peak hour traffic at NH 37-Mancotta Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	768

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement and signalisation.

Table 154 Veh/Day at NH37-Mancotta Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
NH 37 (AT Road) – Mancotta Road Intersection	8587	8867

(Source: Compiled by Consultants)

7.8.3 INTERSECTION - 2 (AMOLAPATTY CHARIALI)*Table 155 Intersection 2 Traffic Congestion Details*

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
NH 37	12	2 lanes undivided Two-way	5	11:30 hrs. & 17:30 hrs.
TR Phukan Road	10	2 lanes undivided Two-way	6	
Steamer Ghat Road	10	2 lanes undivided Two-way	1.2 (Footpath Only)	

(Source: Compiled by Consultants)*Figure 118 Queuing Length of Intersection 2**(Source: Compiled by Consultants)*

Amolapatty Chariali is a 4-Arm junction and the total daily traffic at this Junction is 11106 PCU. The peak hour and peak hour traffic at the junction is presented in Table 156.

Table 156 Peak hour traffic at Amolapatty Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	956

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement, channelization and signalisation.

Table 157 Veh/Day at Amolapatty Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Amolapatty Chariali	6450	11254

(Source: Compiled by Consultants)

7.8.4 INTERSECTION - 3 (NH-37 – CONVOY ROAD JUNCTION)

Table 158 Intersection 3 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
NH 37	12	2 lanes undivided Two-way	5	11:30 hrs. & 17:30 hrs.
Convoy Road	10	2 lanes undivided Two-way	6	

(Source: Compiled by Consultants)

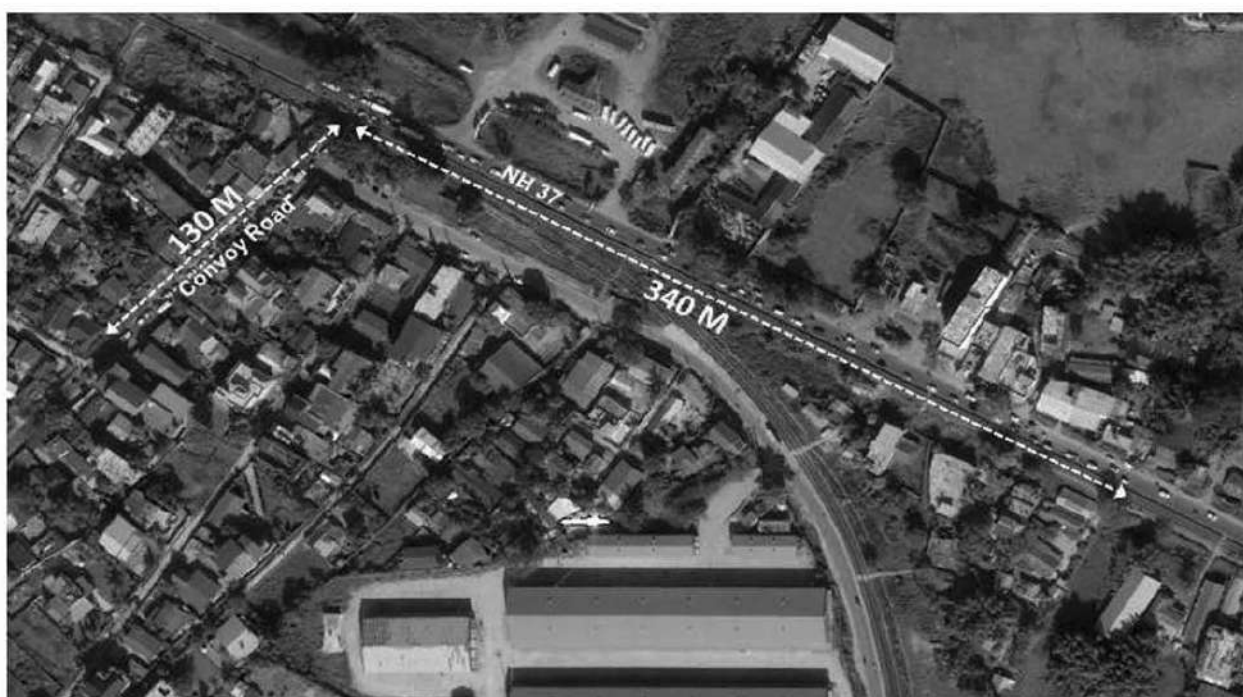


Figure 119 Queuing Length of Intersection 3

NH-37 – Convoy road Junction is a 3-Arm junction and the total daily traffic at junction is 9067 PCU. The peak hour and peak hour traffic at the junction is presented in Table 159.

Table 159 Peak hour traffic at Convoy-NH37 Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	675

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment and electricity poles along with geometric improvement, channelization and signalisation.

Table 160 Veh/Day at Convoy-NH37 Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Convoy – NH-37 intersection	5405	9287

(Source: Compiled by Consultants)

7.8.5 INTERSECTION - 4 (GABHARUPOTHAR JUNCTION)

Table 161 Intersection 4 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
NH 37	12	2 lanes undivided Two-way	3	11:30 hrs. & 17:30 hrs.
RKB Path	10	2 lanes undivided Two-way	2	

(Source: Compiled by Consultants)



Figure 120 Queuing Length of Intersection 4

Gabharupothar Junction is a 3-Arm junction and the total daily traffic at junction is 8125 PCU. The peak hour and peak hour traffic at the junction is presented in Table 162.

Table 162 Peak hour traffic at Gabharupothar Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	345

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement, channelization and signalisation.

Table 163 Veh/Day at Gabharupothar Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Gabharupothar Junction	4503	8397

(Source: Compiled by Consultants)

7.8.6 INTERSECTION - 5 (THANA CHARIALI)

Table 164 Intersection 5 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
Mancotta Road	10	2 lanes undivided Two-way	6	11:30 hrs. & 17:30 hrs.W
RKB Path	10	2 lane undivided Two-way	2	

(Source: Compiled by Consultants)



Figure 121 Queuing Length of Intersection 5

Thana chariali Junction is a 4-Arm junction and the total daily traffic at Thana Junction is 11091 PCU. The peak hour and peak hour traffic at the junction is presented in Table 165.

Table 165 Peak hour traffic at Thana Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	1002

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement, channelization and signalisation.

Table 166 Veh/Day at Thana Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Thana Chariali	9605	11834

(Source: Compiled by Consultants)

7.8.7 INTERSECTION - 6 (NH 37 AND RKB ROAD JUNCTION)

Table 167 Intersection 6 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
NH 37	12	2 lanes undivided Two-way	5	11:30 hrs. & 17:30 hrs.
RKB Path	10	2 lane undivided Two-way	2	



Figure 122 Queuing Length of Intersection 6

NH 37-RKB road Junction is a 3-Arm junction and the total daily traffic at the Junction is 7224 PCU. The peak hour and peak hour traffic at the junction is presented in Table 168.

Table 168 Peak hour traffic at NH 37-RKB Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	350

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment and electricity poles along with geometric improvement, channelization and signalisation.

Table 169 Veh/Day at NH 37-RKB Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
NH 37 – RKB Road intersection	4823	7567

(Source: Compiled by Consultants)

7.8.8 INTERSECTION - 7 (CHOWKIDINGEE CHARIALI)

Table 170 Intersection 7 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
Mancotta Road	10	2 lanes undivided Two-way	6	11:30 hrs. & 17:30 hrs.
TR Phukan Road	10	2 lane undivided Two-way	5	

(Source: Compiled by Consultants)



Figure 123 Queuing Length of Intersection 7

Chowkidingee Junction is a 4-Arm junction and the total daily traffic at Chowkidingee Junction is 13255 PCU. The peak hour and peak hour traffic at the junction is presented in Table 171.

Table 171 Peak hour traffic at Chowkidingee Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	1153

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment and electricity poles along with geometric improvement and channelization

Table 172 Veh/Day at Chowkidingee Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
Chowkidingee	9287	13833

(Source: Compiled by Consultants)

7.8.9 INTERSECTION - 8 (HS ROAD AND RKB PATH JUNCTION)

Table 173 Intersection 8 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
RKB Path	10	2 lanes undivided Two-way	6	11:30 hrs. & 17:30 hrs.
HS Road	10	2 lane undivided Two-way	5	

Source: Compiled by Consultants



Figure 124 Queuing Length of Intersection 8

HS-RKB road Junction is a 3-Arm junction and the total daily traffic at this Junction is 7425 PCU. The peak hour and peak hour traffic at the junction is presented in Table 174.

Table 174 Peak hour traffic at HS-RKB Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	698

Source: Compiled by Consultants

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement.

Table 175 Veh/Day at HS-RKB Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
HS-RKB road intersection	7345	7567

Source: Compiled by Consultants

7.8.10 INTERSECTION - 9 (NH 37 AND AMC ROAD JUNCTION)

Table 176 Intersection 9 Traffic Congestion Details

Road	C. W. Width (m)	No. of Lanes	Shoulder + Footpath Width (m)	Peak Congestion Hours
NH 37	12	2 lane undivided Two-way	5	11:30 hrs. & 17:30 hrs.
AMC road	12	2 lane undivided Two-way	4	

(Source: Compiled by Consultants)



Figure 125 Queuing Length of Intersection 9

NH 37-AMC Junction is a 3-Arm junction and the total daily traffic at this Junction is 9426 PCU. The peak hour and peak hour traffic at the junction is presented in Table 177.

Table 177 Peak hour traffic at NH 37-AMC road Junction

Peak Hour	10:00-11:00
Peak Hour Traffic (PCU/hr)	907

(Source: Compiled by Consultants)

The current capacity of junction may be improved by removing encroachment, electricity poles and vendors along with geometric improvement, channelization and signalisation.

Table 178 Veh/Day at NH 37-AMC Junction

Location	Minor Road (Veh/day)	Major Road (Veh/Day)
NH 37-AMC Road intersection	8397	9506

(Source: Compiled by Consultants)

7.9 PEDESTRIAN SURVEY

Pedestrian survey was conducted both along the road and across the road near New market area on HS road and Market road.



Figure 126 HS Road Pedestrian movement



Figure 127 New Market Road Pedestrian movement

Table 179 Footpath inventory at HS and New Market road

Location	Peak Hour	Passenger Flow	Existing Footpath width (m)	Required Footpath width (m)
HS Road	16:00 - 18:00	350	1.5	1.5
New Market Road	11:00 - 12:00	520	1	1.5

IRC 103 recommends the minimum footpath width as 1.5m. Hence it is recommended that the footpath width on New market Road be increased to 1.5m.

Pedestrian-vehicular conflict can be effectively studied through the indicator PV2 suggested in IRC 103, 'Guidelines for Pedestrian Facilities'. The code suggests some form of control measures at mid blocks and intersections where the indicator PV2 is greater than or equal to 1×10^8 for undivided carriageways where 'P' is the peak hour pedestrian volume and 'V' is the number of vehicles in that peak hour. Analysis of the peak values for PV2 and the hour in which the same is observed is presented in Table 180.

Table 180 Pedestrian Cross traffic survey

Location	Peak Hour	P	V	PV ² /10 ⁸
HS Road	16:00 - 18:00	350	675	1.59
New Market Road	11:00 - 12:00	520	320	0.5

(Source: Compiled by Consultants)

Huge pedestrian traffic volume is observed along the links and intersections within the core areas – as walking is one of the dominant modes of movement.

Most of the links do not have adequate footpaths on both sides to accommodate the high pedestrian volume. Many Streets observed with huge encroachment on footpaths by local vendors and commercial facility owners which forcing pedestrians to move along the carriageway. The major deficiencies are:

1. Inadequate/irregular riser and tread
2. Poor surface condition
3. Poor illumination
4. Lack of railing and landing facilities for long flight of steps

As walking is the only effective Non-Motorized Transit (NMT) mode, management of pedestrian facilities along with steps and accessibility on footpaths can significantly boost the patronage for NMT movement within DMPA.

7.10 SPEED DELAY SURVEY

The survey was conducted along five major travel corridors. Journey and running speeds derived from the survey in the two directions of travel are presented in Table 181.

Table 181 Observed Speed along Major road

Sl. No.	Road Section	Direction	Journey Speed (kmph)	Running Speed (kmph)
1.	NH 37 (AT Road)	Panchali to Phoolbagan	22.3	41.5
		Phoolbagan to Panchali	25.6	44.2
2.	Mancotta Road	Thana to Chowkidingee	18.6	26.4
		Chowkidingee to Thana	19.5	29.1
3.	T R Phukan Road	Amolapatty to Chowkidingee	24.8	35.6
		Chowkidingee to Amolapatty	25.6	39.3
4.	RKB Road	Boga baba Tinali to HS Road	26.8	40.2
		HS Road to Boga baba Tinali	28.6	42.6

(Source: Compiled by Consultants)

The low values of Journey and Running speeds indicate major congestion. Thus intervention is required to relieve congestion through capacity augmentation and traffic management.

7.11 PARKING STUDY

A space occupied by vehicle for a particular period of time when it is not under any use can be known as parking. If any vehicle comes on road, it always requires a parking to rest as a human requires bed to rest for a particular time period, so it is recommended in these days for any busy landuse activity to come up with proper parking plans for required number of vehicles. The parking in urban areas is found to be of two types namely on-street parking which is done on the side of streets with space provided and other is off-street parking which is a modern concept and is done when there is a lack of space in the urban area.

7.11.1 EXISTING PARKING AVAILABILITY

The parking areas are an important component in the urban transportation network. The parking areas become very important in the Central Business District areas (CBD) and public activity area, where the traffic movement is very heavy. At present around 0.14 hectare of organized parking at old railway station on RKB road area within CBD is being used for four-wheeler parking area. Murlidhar Jalan Bus station is utilized as unorganized parking area on NH 37. Banipur railway station is having approx. 0.40 hectare open parking space. (refer to table 182 and fig 128).

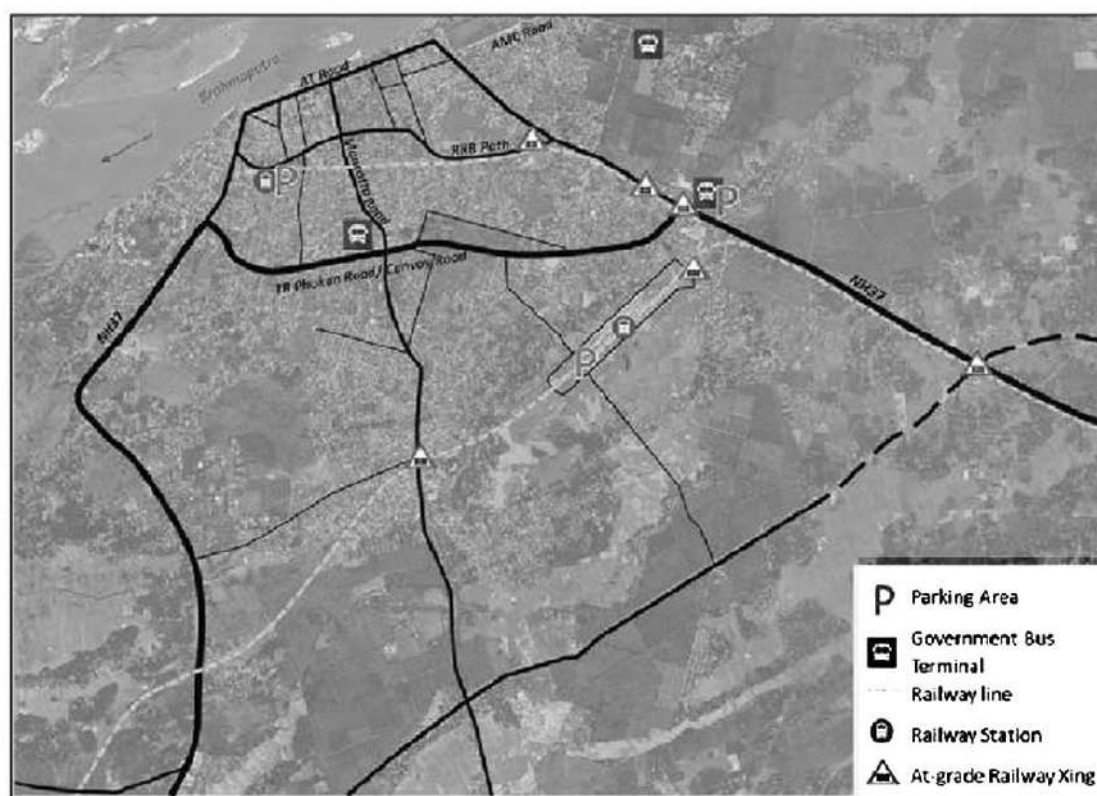


Figure 128 Existing parking facility

Table 182 Parking Spots and their Area Coverage

Parking Space/Area	Location	Type of Parking	Area (Hectare)
Old Railway Parking Area	RKB road	Organized ground level parking	0.14
New Railway Parking Area	Banipur	Organized ground level parking	0.40
Murlidhar Jalan Bus Station	Jalan Nagar	Unorganized ground level parking	0.30

(Source: Compiled by Consultants)

At present there is no multilevel organized parking facility been provided within CBD area urban local body control. There are 2 organized paid parking facility available in public spaces like Dibrugarh Airport terminus and at railway station.

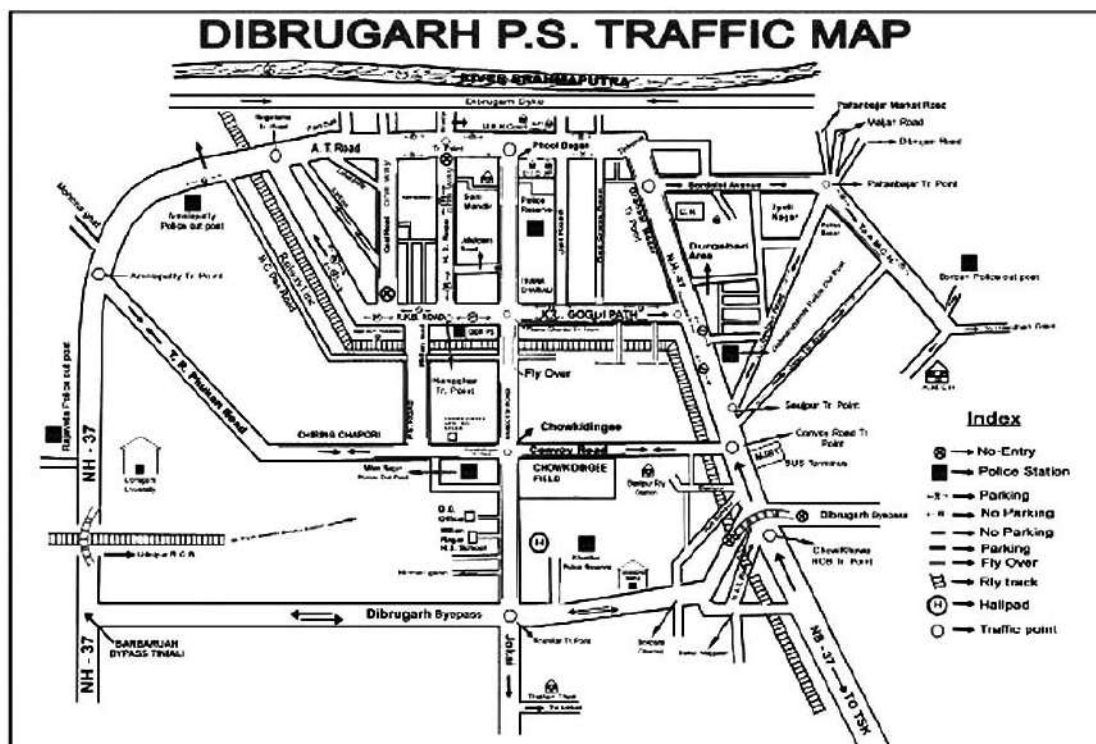


Figure 129 Dibrugarh Traffic Management Map

Apart from the demarcated paid parking identified area, the on-street parking also practiced in the entire Dibrugarh town area where heavy traffic movement or public activity is observed. Dibrugarh Traffic Police department has identified some parallel patches along the roadside to meet the demand of two-wheeler parking within the CBD area. To decongest the commercial area from vehicular traffic the HS road and Cole road have been converted into one way road during working and peak hours. The entry of vehicle on HS Road is restricted from North end whereas from south end in case of Cole road. The on-street parking of vehicles coming within CBD area (New Market Area), Mancotta Road and RKB road are mainly



Figure 130 HS Road On-Street parking



Figure 131 RKB road street

due to commercial facility, trading activities, schools and government buildings. Since there is no provision given of private parking to local residents of CBD, they park owned vehicles at parallel parking slots which creates another hurdle of parking occupancy for consumers and visitors to market area. It is observed that need for additional parking area is keenly felt in CBD area, schools and government buildings which is already congested with heavy traffic. In fact, since the kerb parking reduces the carriage way width, the regulation authorities take action to allow parking on one side only. There is no scope for increasing the on-street parking in CBD area during Peak hours.

7.11.2 PARKING SURVEY

High ownership pattern and excessive dependence on private mode of movement, i.e., two-wheelers and cars exert huge parking demand. As most of the parking demand is met by on-street facilities due to absence of designated off-street facilities, leading to traffic congestion in the core area.

Parking survey was conducted at on street locations where vehicular parking was observed. On-street parking is observed to be high on HS Road and RKB Road. The percentage of vehicles parked for long-term (>1 hr) is high at the two locations constituting 93% at HS Main Road and 84% at RKB Road. Analysis of parking demand is presented in Table 183.

Table 183 Existing Parking Demand in Equivalent Car Space on HS Road and R.K.B Road

Sl. No.	Location	Parking Type	Peak Accumulation (ECS)	Peak Hour
1	HS Road	On Street	144	16:00 - 18:00
2	RKB Road	On Street	85	13:00 - 14:00

Table 184 Parking Demand Capacity Analysis on HS Road and R.K.B Road

Sl. No.	Location	Demand (ECS)	Capacity (ECS)	Demand/ Capacity
1	HS Road	144	90	1.6
2	RKB Road	85	60	1.2

As evident from the above table, the parking location on HS Main Road is fully saturated and leading to sever encroachment on street, moreover that on RKB Road is also saturated with parking slots but leads to encroachment on fewer locations only. After parking of vehicles, about 5m space is only available as roadway at the two locations. Interference to through traffic is caused during parking and un-parking operations. Thus, the authorised on-street parking lots results in considerable congestion. The on-street parking reduces the effective carriageway width thereby inducing congestion. Need for additional parking area is keenly felt in the Dibrugarh Town because of the commercial activities and due to the presence of schools and government buildings.



7.12 ISSUES AND REQUIREMENTS

7.12.1 UNAUTHORISED VENDING

- One of the major issues is of illegal vending on walking shoulders on the main streets.
- Due to this illegal vending sometimes the actual accessible patch of road decrease to half lane only.
- If proper spaces are being allocated to street vendors in every zone the issue can be eliminated.
- Due to illegal possession of shoulders the pedestrian come down to road for their local trip and some time proves unsafe on congested area.
- Narrow road network with restricted capacity, particularly due to the illegal vending, resulting in congestion and loss of productivity.
- The problematic areas include **Intersection of Sivanath Bhattacharjee path at Convey Road, Intersection of Rudhali path and Convey Road, Near Rupkonwar Trading Agency, Along T R Phukan Road, Leela Gogoi path and Covey Road Intersection, Along NH37, Near Sukafaa Bhubwan Tineali, Tepor Gaon Road and Mancota Road Intersection, along RKB path, along Convey Road etc.**
- The photographs below depict the current scenario of the illegal vending zones which restricted the capacity of road which in result lead to congestion.
- The illegal vending zone locations have been marked on the map (Fig. 132)



Mancotta Road, Dibrugarh

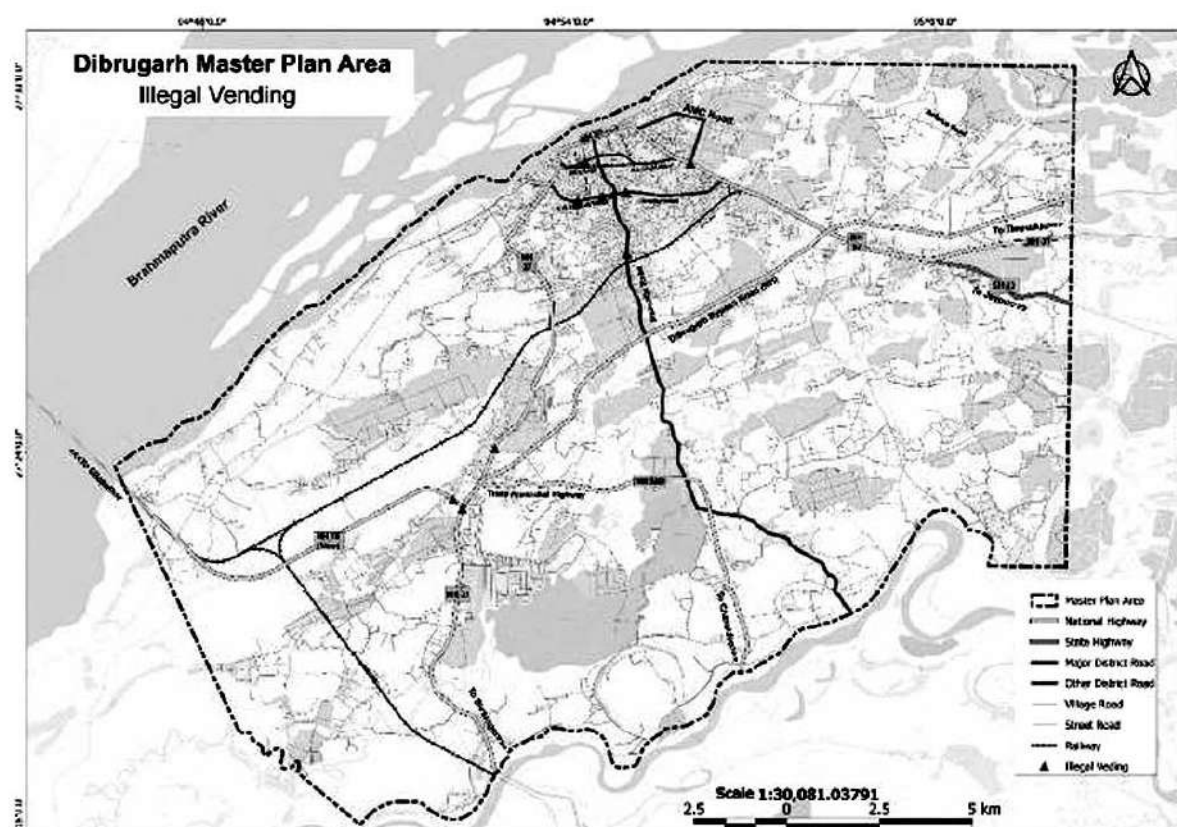


Figure 132 Illegal vending zone locations

7.12.2 TRAFFIC CONGESTION

- Traffic congestion is quite common, and it takes a lot of time to commute for the commuters.
- At many places geometry of roads and intersection are not adequate and absence of functional hierarchy of road network leads to the traffic congestion.
- The average roads width of the town is very less as they have not followed any norms and standards for the road pattern as well as for other related things like road cross sections, etc.
- Observed encroachments on the footpath by vendors, which acutely rise the traffic congestion between **Graham Bazar Tiniali and the gate of Assam Medical College and Hospital (AMCH)**, and parking on both sides of the road and the resultant traffic need to resolve.
- Many vehicles, due to lack of adequate parking facilities, were parked near Chowkidinghee Field, causing inconvenience to people who use the field for recreational purposes like walking and playing and also people had to face inconvenience as that road leads to many important places like **Milan Nagar, Mancotta, Khanikar and Thakurthan**.
- Other roads having traffic congestion are **NH 37 (AT Road), Amolapatty to AMC and AT Road junction** having C.W. of 15 metres, **Convey Road / T.R Phukan Road (13 metres), Mancotta Road and RKB Path upto Thana Chariali (11 metres)**.
- The highlighted light blue patches in map within town area shows the frequent congested road patches (Fig. 133)

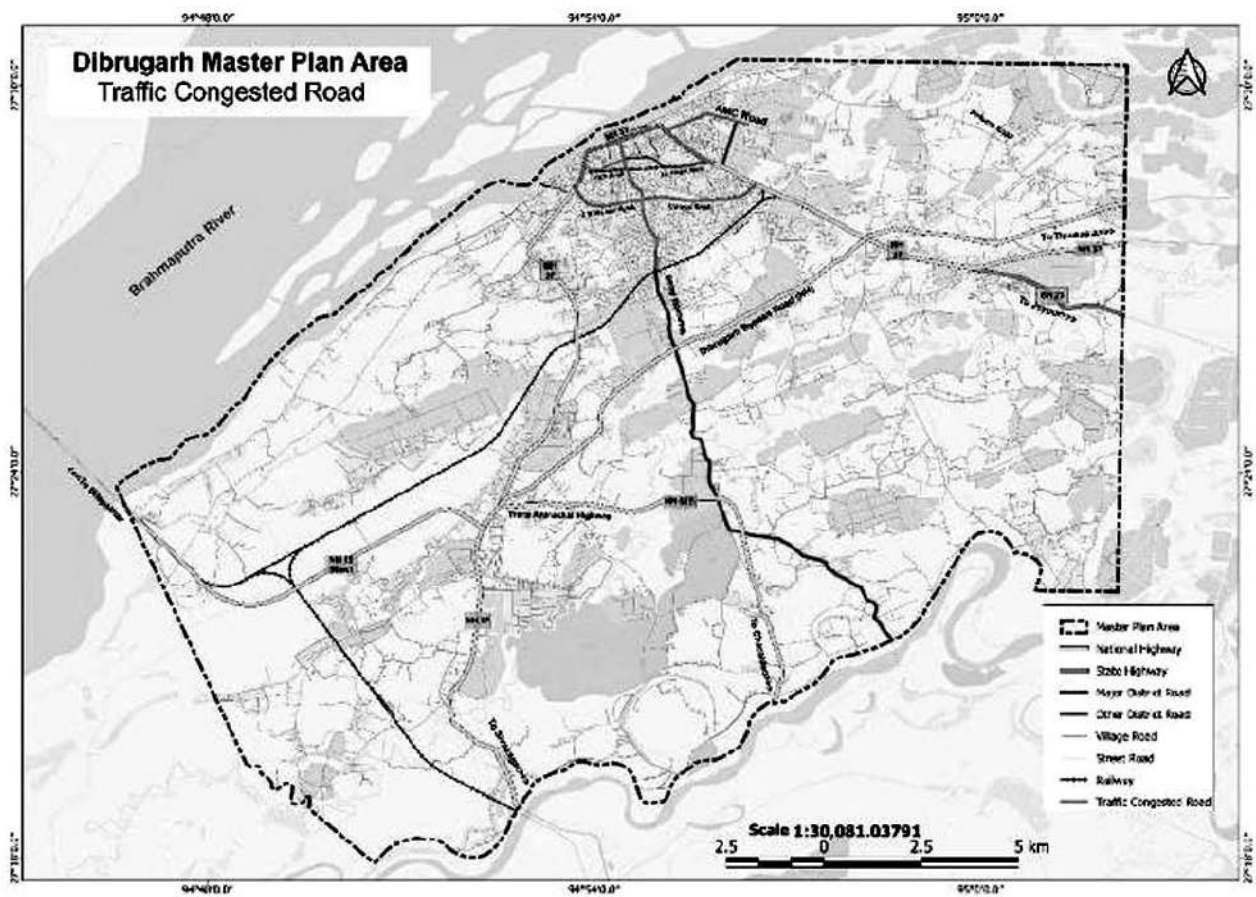
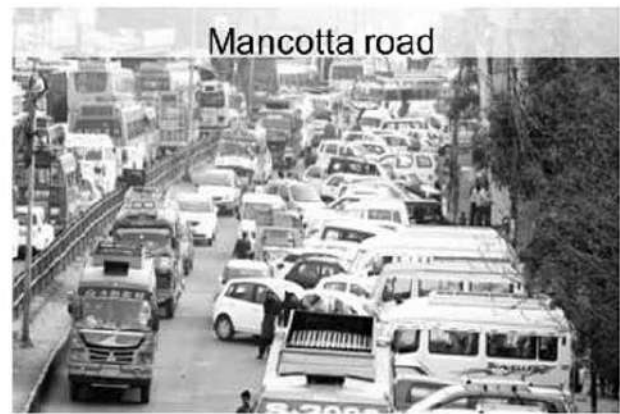


Figure 133 Traffic Congestion map of Dibrugarh Master Plan Area

7.12.3 ROAD ENCROACHMENTS

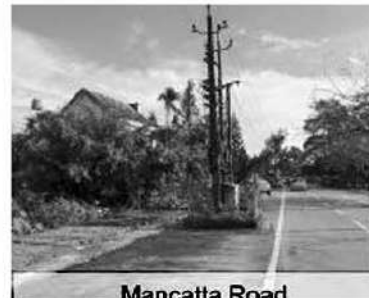
- Many factors can be listed out for such happenings, but few observations are mentioned below, which are
- Unauthorized parking of vehicle on pavement only.
- Many spots with exposed electric poles on pavement sides which leads to make space dead and potential for parking wheels.
- The town suffers from parking problems due to encroachment by vendors on road and off-street parking. As a result, the road width decreases and there is no space remaining to pass the vehicles or to give space to other vehicles.
- There is no designated space for parking in whole town.
- There are encroachment issues in areas namely both sides of Dibrugarh Flyover near Gadapani tinali, along RKB Path near Galleria Cinemas Dibrugarh, along NH 37 Road near Chaulkhowa Railway station, under Dibrugarh Flyover in Kamar gaon and along NH 37 near RKB Path and AT Road junction.
- Due to lack of space it is difficult for vehicles to pass on.
- Also, proper facilities are required for loading,unloading and uplifting goods from carriages.
- Encroachment on both sides of the road decreases the effective width which may cause road accidents and disturbs the smooth flow of traffic.
- The map shows the road network of planning area with identified spots of encroachment on roads (Refer to Figure 134).



Chowkidinnee Road



Amolapatty Road



Mancatta Road

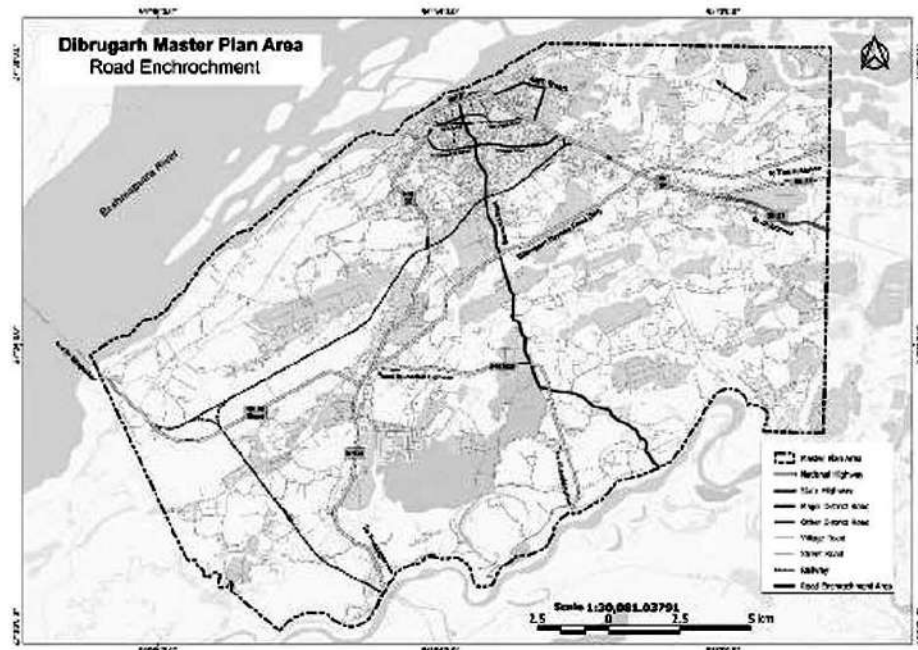


Figure 134 Road encroachment areas

7.12.4 ILLEGAL PARKING AREA

- With increasing number of vehicles, narrow roads, absence of parking spaces within majority of built areas, parking becomes critical for planning and development.
- There is more of commercial area, so the shopkeepers park their vehicles outside the shops leading to decrease in the width of the road.
- There is no proper arrangement for parking vehicles which results into roadside parking.
- Some of the streets are observed by frequent haphazard parking on side of the pavements.
- Low accessibility and traffic congestion are resulting due to such happenings.
- As per the temporal study the town is growing at fast rate leads to more and more traffic problems like today's it does not have sufficient parking and also number of vehicles are increased rapidly which will lead to the parking shortage in the town.
- The areas with illegal parking are **near RKB Path and Mancotta Road junction**, opposite Khaleel Market, **opposite Dibrugarh Police Station along Mancotta Road, RKB Path and HS Road Junction**, Cole Road and AT Road Junction, near Aastha Pharmaceuticals, **along Amolapatty NH 37 Road**, opposite S.S Enterprise, **along Mancotta Road near Bank of Maharashtra Dibrugarh Branch, Mancotta Road and Lane E junction**, **near SBI ATM, along Convey Road** near Don Bosco Higher Secondary School.
- The marked spots on map are regular area for illegal parking (Figure 135).



Chowkidingee Mancotta Road



Chowkidingee Mancotta Road



AMC Road



RKB Road

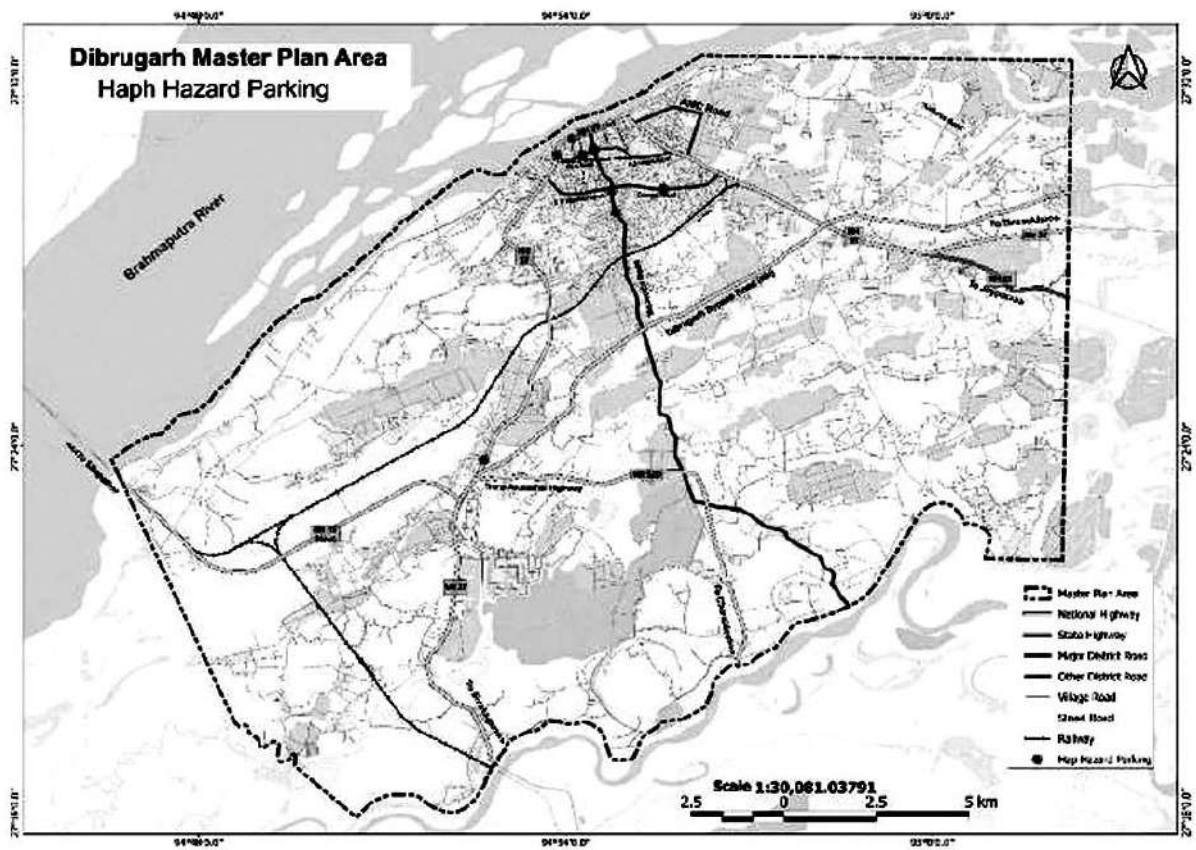


Figure 135 Haphazard parking locations



New Market Road, Dibrugarh

7.12.5 JUNCTIONS WITHOUT TRAFFIC SIGNALS

- Many traffic intersections observed with insufficient traffic control facility
- The below mentioned are junction with Non -working traffic signals
- Resulting in unnecessary traffic jams and more requirement of traffic brigade occurs.
- Various junctions are performing without traffic signals in town like Khanikar Chariali, RKB Road and Kalibari Road junction, HS Road and RKB Path junction, Medical Tiniali, Paltanbazar Panchiali Junction, AMC Road and GM Modi Road Junction etc.
- The marked spots on map are junctions without traffic signal (Figure 136).

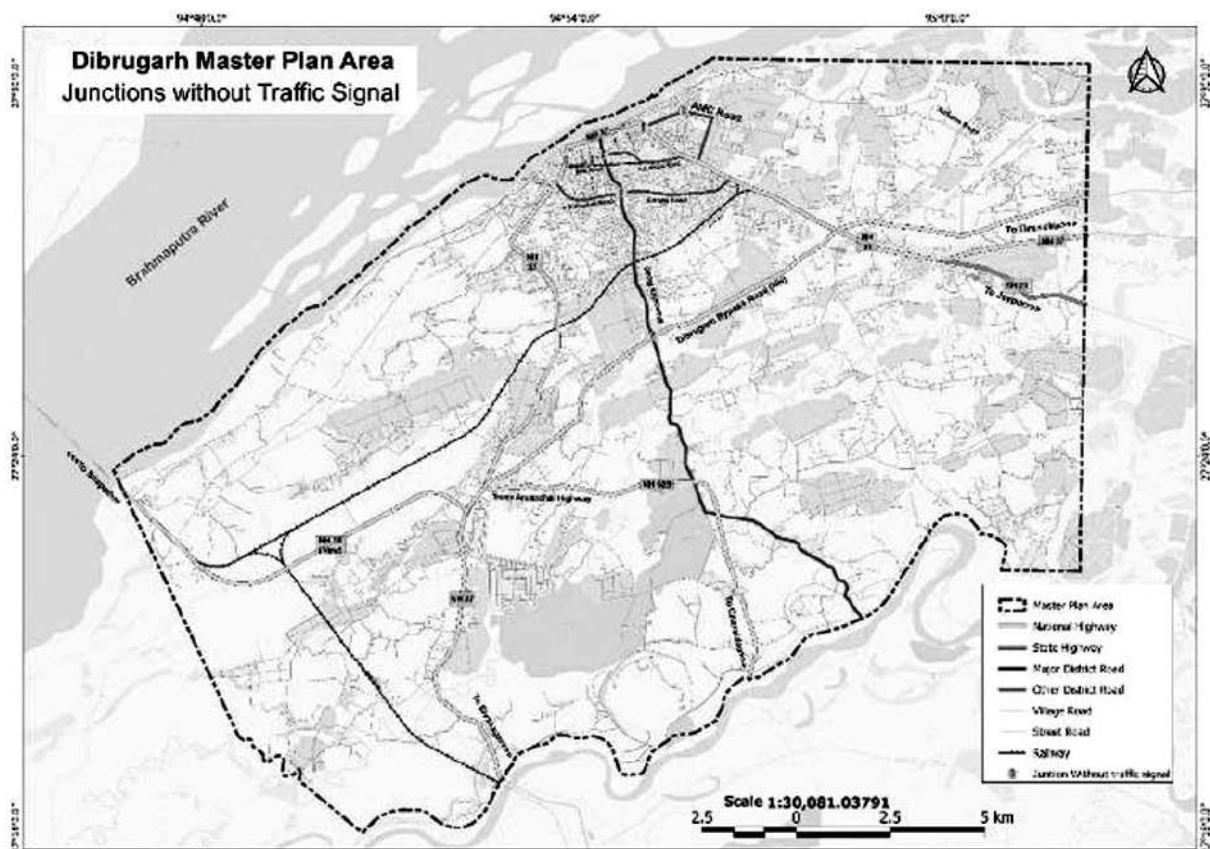


Figure 136 Junctions without traffic control facilities

7.13 PROPOSALS AND RECOMMENDATIONS

7.13.1 GRADE SEPARATION PROPOSAL

Grade separation is the separation of the levels at which roads cross one another to prevent conflicting rows of traffic or the possibility of accidents. Here the existing road is single lane with the 3.75 m of carriage way which is proposed to be a 4-lane road. The proposed location of grade separator is depicted in figure 137.

Table 185 Grade Separation Proposal

Length (KM)	Existing Configuration	Proposed Configuration
16.03	Single Lane (3.75m)	4 Lane divided

(Source: Compiled by Consultants)



Figure 137 Proposed grade separator location

7.13.1.1 Grade Separator - 1 (NH-37 & Bypass Road Intersection)

A grade separator has been proposed on NH-37 which will divert the traffic and solve the issue of congestion. This is proposed on the NH-37 and bypass road intersection.

Refer figure 138 where the elevated section is shown with blue colour and the ram is shown in pink color.

Table 186 Road details of Intersection 1 - Grade Separation Proposal

Road	C.W. Width (m)	Lanes
NH 37/ NH 2	7.5	2 lanes undivided Two-way
Barbaruah Road	7	2 lanes undivided Two-way
Bypass Road	7.2	2 lanes undivided Two-way



Figure 138 Intersection 1 Proposed Grade Separation

7.13.1.2 Intersection - 2 (NH15 & NH-37)

Another proposed grade separator is on NH-15 to ease out the proposed daily traffic movement merging to NH-37. Since NH-37 is proposed for 60mt ROW, the traffic movement needs to be uninterrupted and that is only possible by designing such grade separator at the intersection.

Table 187 Road details of Intersection 2 - Grade Separation Proposal

Road	C.W. Width (m)	Lanes
NH 37	7.5	2 lanes undivided Two-way
NH 15	7.5	2 lanes undivided Two-way

Source: Compiled by Consultants



Figure 139 Intersection 2 Proposed Grade Separation

Source: Compiled by Consultants

7.13.1.3 Grade Separator - 3 (Mancotta Road R.O.B on Banipur Railwayline)

Another proposed grade separator is on Mancotta road to ease out the proposed daily traffic movement pass through Banipur railway line.

Table 188 Road details for ROB

Road	C.W. Width (m)	Lanes
Mancotta Road	7	2 lanes undivided Two-way



Figure 140 Proposed ROB on Mancotta road

7.13.1.4 Grade Separator - 4 (Khanikar Chariali)

Since Dibrugarh bypass is proposed for 60mt ROW, the traffic movement needs to be uninterrupted and to make it possible a grade separator at the Khanikar intersection required to take place.

Table 189 Road details of Khanikar Intersection

Road	C.W. Width (m)	Lanes
Mancotta road	7	2 lanes undivided Two-way
Dibrugarh bypass	10	2 lanes undivided Two-way



Figure 141 Proposed Grade separator on Bypass Road at Khanikar Chariati

7.13.1.5 Grade Separator - 5 (Banipur R.O.B)

Another proposed R.O.B is on Banipur Railway Station main lines to ease out the proposed daily traffic movement pass through current minor road surrounding railway station.



Figure 142 Proposed ROB on proposed major road near Banipur Railway Station

7.13.2 RING ROAD PROPOSAL

7.13.2.1 Widening and Acquisition in Proposed Ring Road

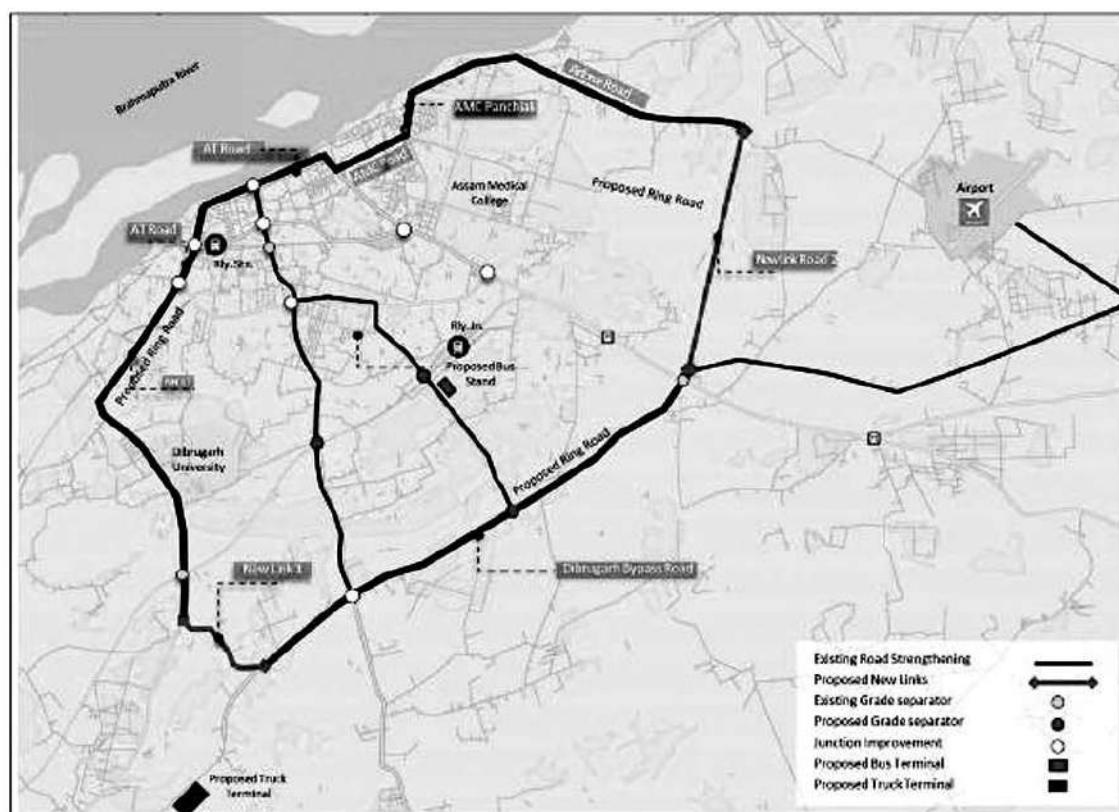


Figure 143 Proposed Improvements in Transport Infrastructure

Table 190 Ring Road Description

Sl. No.	Road Section	Length (km)	Existing C. W. (m)	Available Road Width (m)	Proposed Road Width (m)	Proposed Configuration
1	AT Road	2	7.0	12	24	4 lanes divided (widening required)
2	NH 37	7.14	7.5	14	30	4 lanes divided (widening required)
3	Dibrugarh Bypass Road	7.71	7.5	45	60	6 lanes divided (widening required)
4	AMC Road	1.17	6.0	10	18	4 lanes divided (widening required)
5	Paltan Bazar Road	0.67	6.0	10	18	4 lanes divided (widening required)
6	Airforce Road	5	6.0	-	30	4 lanes divided (widening required)
7	New Link 1	1.45	5.5	10	30	4 lanes divided (land acquisition required)
8	New Link 2	3.86	-	-	30	4 lanes divided (land acquisition required)
Total		29.00				

7.13.2.2 Widening and Acquisition in Proposed Outer Ring Road

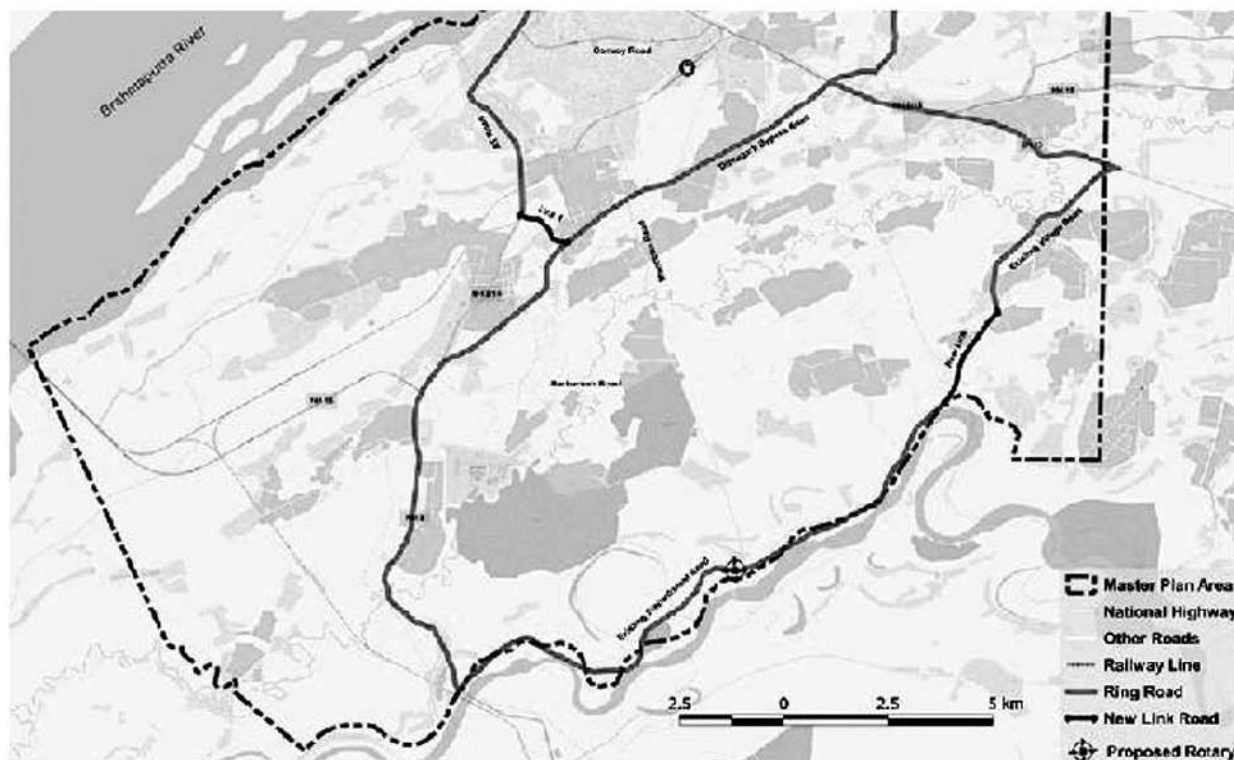


Figure 144 Proposed Outer Ring Road

Table 191 Outer Ring Road Description

Sl. No.	Road Section	Length (km)	Existing C. W. (m)	Available Road Width (m)	Proposed Road Width (m)	Proposed Configuration
1	Burhi Dihing River Embankment Road	16.04	4.5	6.5	45	4 lanes divided (widening required)
2	NH 37 (From Gammon Bridge to Borboruah Circle)	12.4	10.5	11	60	6 lanes divided (widening required)
3	Dibrugarh Bypass Road	9.68	7.5	12	60	6 lanes divided (widening required)
4	SH 23	4.6	6.8	8	45	4 lanes divided (widening required)
5	NH 37 (From Bokul to Lahowal)	2.82	6.5	11	30	4 lanes divided (widening required)
6	Village road	5.30	-	3.8	45	4 lanes divided (widening required)
7	New Link Road	2.78	-	-	45	4 lanes divided (land acquisition required)
Total		53.62				

7.13.3 PROPOSED IPT STANDS AND ROUTES

Intermediate Public Transport (IPT), sometimes known as Paratransit, refers to road vehicles used on hire for flexible passenger transportation, which do not follow a fixed time schedule. They may or may not follow a fixed route. It will be much viable if proper space allocation being done for the passenger transfer movement at prime locations. Here, mentioned in map are identified IPT stand for passenger's safe transfer for one mode to another mode.

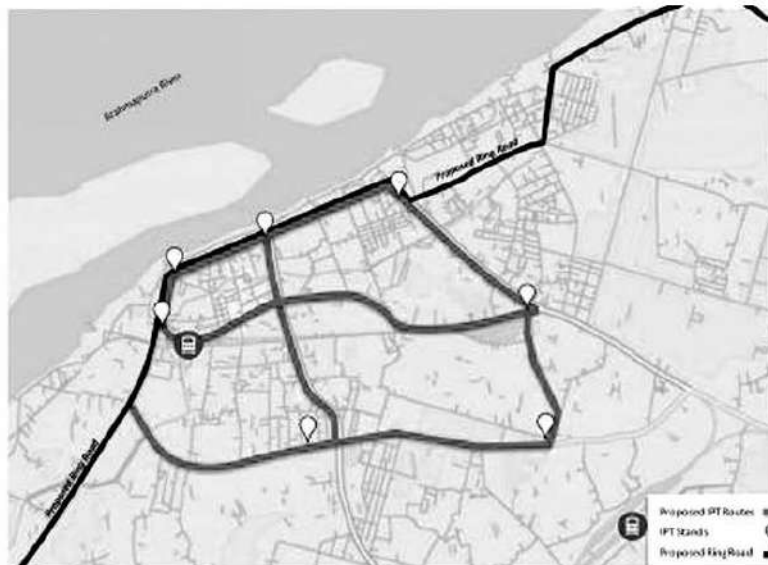


Figure 145 Proposed IPT stands and routes location

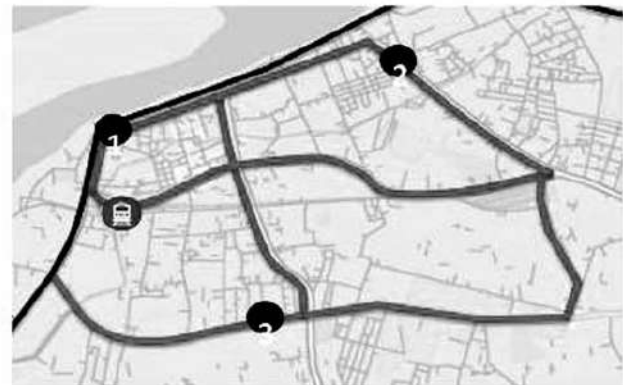


Figure 146 Proposal for IPT stands location

7.13.4 JUNCTION IMPROVEMENT

7.13.4.1 Intersection - 1 (Amolapatty Chariali)

The current capacity of junction may be improved by widening the road width of NH-37 by 24 mt. with divided 4 lanes, removing electricity poles and vendors along with geometric improvement and signalisation. Widening of T. R. Phukan Road and Steamer Ghat road will ease out maneuvering movement of vehicle around junction.



7.13.4.2 Intersection - 2 (Thana Chariali)

The current capacity of junction may be improved by widening the road width of RKB Path by 15 mt. with divided 4 lanes, removing electricity poles and vendors along with geometric improvement and signalisation. Widening of Mancotta road up to 24 mt will ease out maneuvering movement of vehicle around junction.



7.13.4.3 Intersection - 3 (Gabharupothar Junction)

The current capacity of junction may be improved by widening the road width of K.C.Gogoi Road upto 15 mt. and NH-37 upto 18 mt. with divided 4 lanes. Additionally, removing electricity poles and Adhoc vendors along with channelization of junction, geometric improvement and signalisation will ease out the traffic condition at junction.

**7.13.4.4 Intersection - 4 (Near Murlidhar Jalan Bus Terminus)**

The current capacity of junction may be improved by closing right turn from Convoy Road to NH-37 and by facilitating U-turn access for Airport and Railway side turnings. Additionally, removing electricity poles and vendors along with geometric improvement and signalisation. Widening the road width of NH-37 upto 45 mt. with divided 4 lanes and Convoy Road up to 18 mt. will ease out maneuvering movement of vehicle around junction.

**7.13.4.5 Intersection - 5 (Nr. Boga baba Masjid)**

The current capacity of junction may be improved by widening the road width of NH-37 Path upto 24 mt. and RKB upto 18 mt. with divided 4 lanes. Additionally, removing electricity poles and Adhoc vendors along with channelization of junction, geometric improvement and signalisation will ease out the traffic condition at junction.



7.13.5 ROAD HIERARCHY

It is important to devise a street classification which is in consideration with the proposed landuse. The roads are classified into the following 3 categories according to their function and activities that take place along the road.

Table 192 Road Category Proposed for Dibrugarh Planning Area

Sl. No.	Category	Characteristics	ROW
1.	Arterial	<ul style="list-style-type: none"> City to City linking Largest volumes of traffic Commercial/Mixed residential uses are predominant along the road 	60 m
2.	Sub-Arterial	Mixed residential Use along the road <ul style="list-style-type: none"> Feeding traffic to arterial roads 	24 m & 30m
3.	Major Roads	Connecting residential areas with sub arterial roads/ arterial roads	18 m & 24 m

7.13.5.1 Arterial Road

A typical cross section of an arterial road is given in the figure below. It shall have carriageways, median, Multi Functional Zones (MFZ), service lanes and footpaths. Multi functional zone is a zone to accommodate street components such as tree planting, auto rickshaw stand, hawkers zone, bus stop, traffic police booth, fire hydrants, street lights etc. as per the requirement. The RoW of the arterial roads varies between 45m and 60m

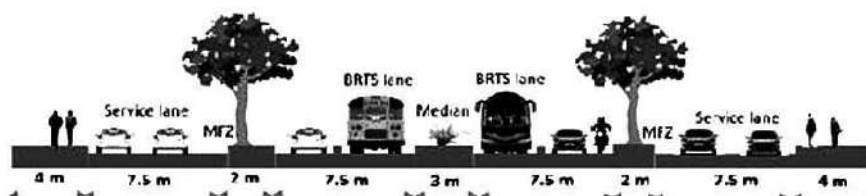


Figure 147 Cross Section of 45m wide Arterial Road

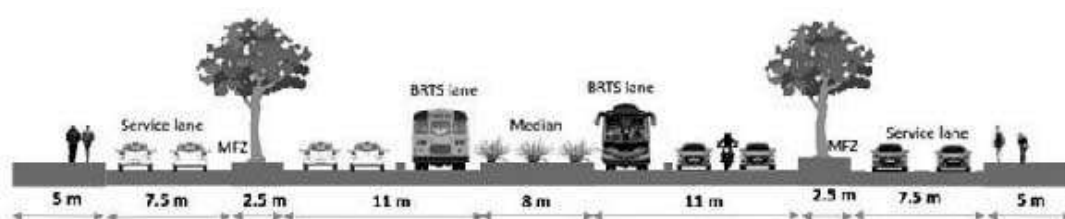


Figure 148 Cross Section of 60m wide Arterial Road

7.13.5.2 Sub-Arterial Roads

Sub arterial roads shall have carriage ways, median, service lanes, Multi-Functional Zones and sidewalks as shown in the figure. As mentioned earlier, the RoW of the sub-arterial road is between 24m or 30m.

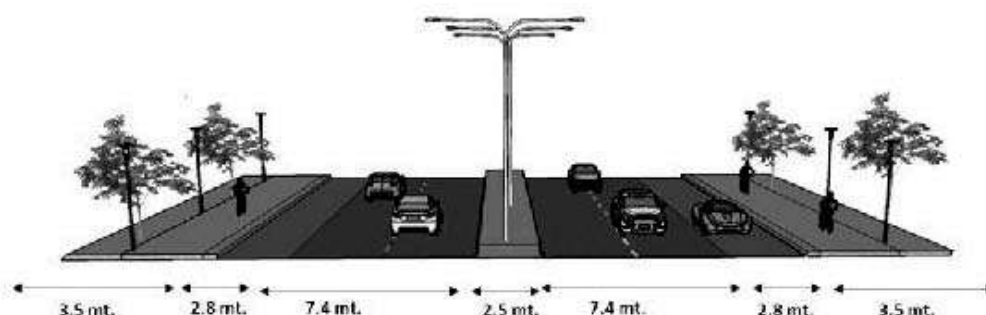


Figure 149 Cross Section of 30m wide Sub-Arterial Road

7.13.5.3 Major Roads

Major roads shall have Carriage ways, median, Multi Functional Zones and sidewalks as shown in the figure. As mentioned earlier, the width of the major road is either 18m or 24m.

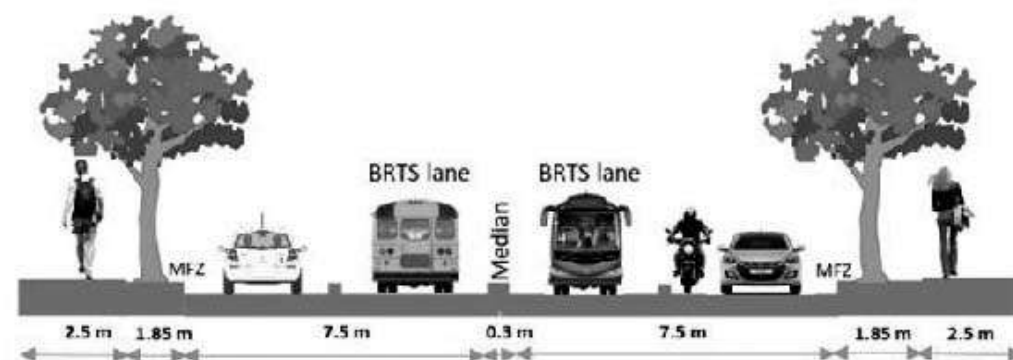


Figure 150 Cross Section of 24m wide Major Road

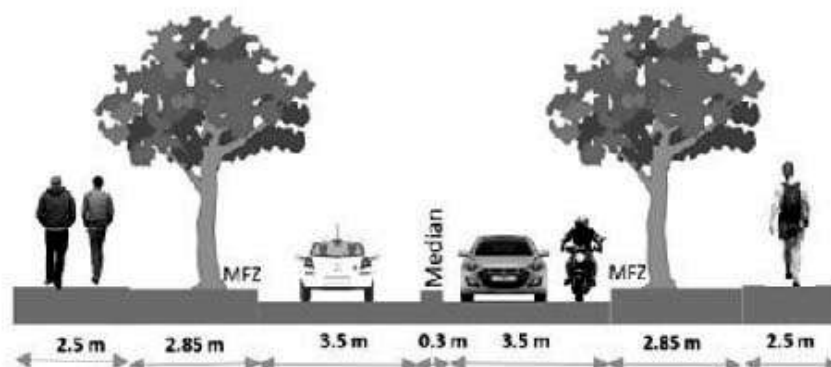
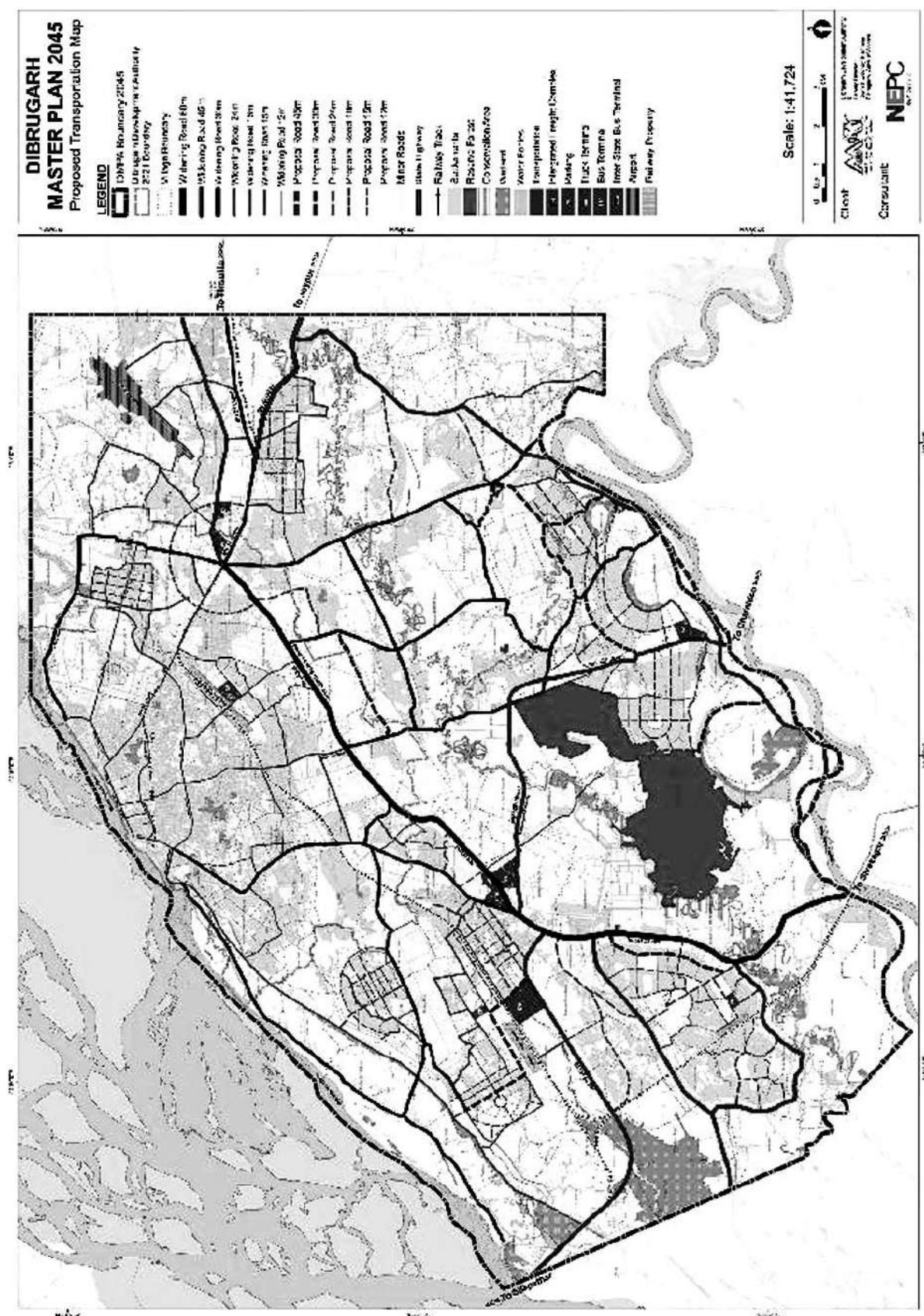


Figure 151 Cross Section of 18m wide Major Road

7.13.6 PROPOSED ROAD NETWORK FOR DMPA



7.13.7 ON-STREET AND OFF-STREET PARKING

As discussed above in section 7.12 Issues, there is no dedicated parking space available in Dibrugarh Planning Area. During reconnaissance survey, On-street Parking has been observed at various locations like NH-37 (AT Road), Mancotta road, Convoy Main Road, TR Phukan intersection, and Cole Road in Dibrugarh Planning Area leading to massive congestion and decreasing the road capacity.

In view of this, there is dire need for providing off street parking facility in potential commercial areas or in close proximity in CBD area. The off-street Car Parking facilities are proposed at different locations mentioned below in Map. The need of Multi Level Car Parking will also be required near Existing Banipur Railway Station. Rest of the locations are identified for on street and off street ground parkings. The Locations are as mentioned below.

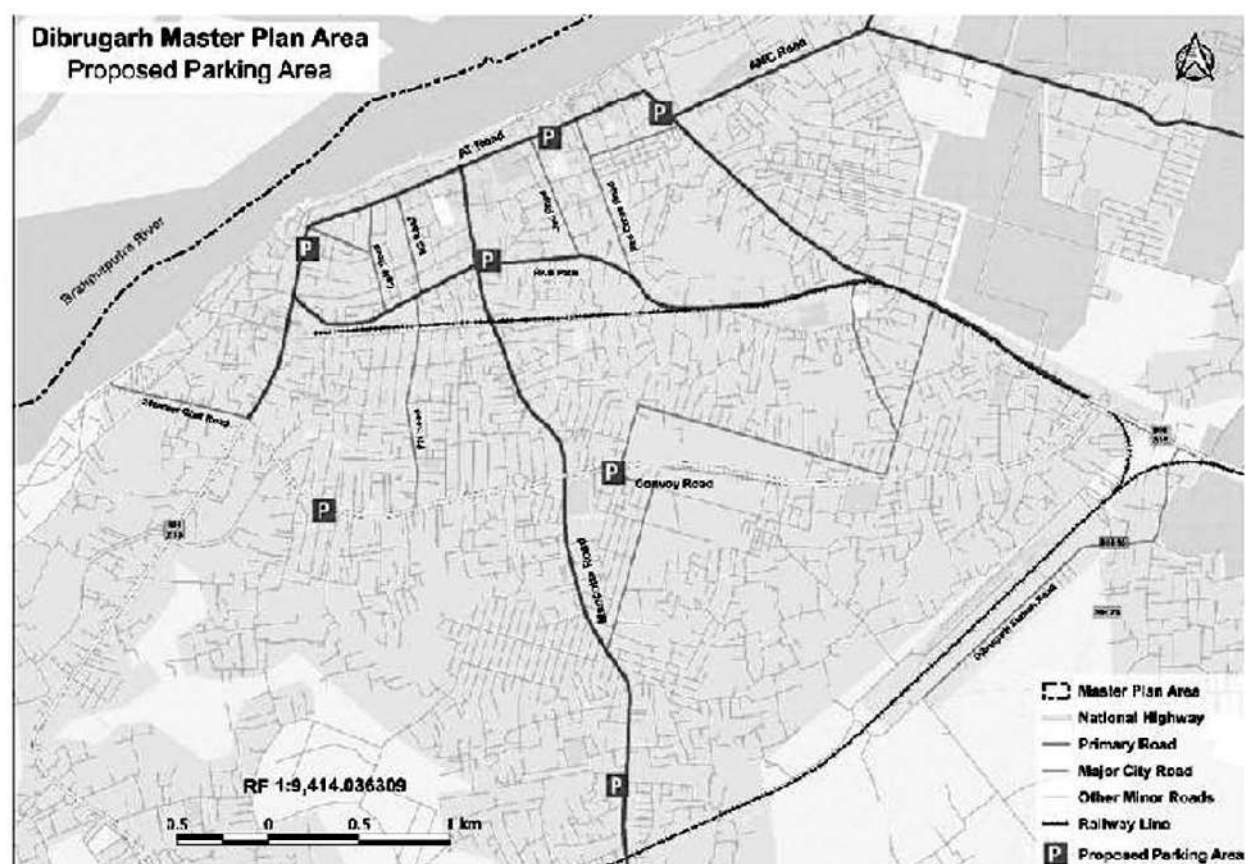


Figure 153 Proposed Parking area near around Core city area

7.13.8 PUBLIC TRANSPORT PROPOSALS

7.13.8.1 BRTS (Bus Rapid Transit System)

Bus Rapid Transit System (BRTS) are generally a high-quality bus based transit system that focuses its operations in large urban areas with fast, comfortable, cost effective services catered for larger commuter populations. BRTS achieves it through the adoption of dedicated lanes with bus bays and bus stations typically aligned to the center of the road, off board fare collection and fast and frequent operations. BRTS is similar to a light rail system, it is considered to be more reliable, convenient and faster than regular bus services due to the fact that they run on dedicate bus bays and hence not delayed by the regular city traffic.

The Dibrugarh City bus system needs to be improved to attract a large portion of the commuters to avoid the use of private vehicles in favour of public transport. For this the prevailing city bus system needs to be strengthened, this can act as a support for the mass rapid transit systems which are elaborated above. BRTS is a successful system adopted by many Indian cities like Ahmedabad and Indore. Due to faster implementation, lesser capital investment BRTS is a good alternative for sustainable transport solution for the planning area. BRTS can be implemented along the major transit corridors like NH-37, NH-52B, SH-23, NH-15, Dibrugarh Bypass road, Mancotta Road, Convoy Road, T R Phukan Road, AT Road, RKB Road, KC Gogoi Road and other major roads like AMC Road. Due to the non-contiguous nature of the planning area BRTS on these said roads might have to pass through normal traffic in areas which falls under core city centre, this might affect the operational advantage of BRTS systems.



Figure 154 Bus Rapid Transit System